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SCIENCE AND TECHNOLOGY ACT OF 1958

ANALYSIS AND SUMMARY

PREPARED BY THE STAFF

AND SUBMITTED TO THE

SENATE COMMITTEE ON GOVERNMENT OPERATIONS

ON

S. 3126

A BILL TO CREATE A DEPARTMENT OF SCIENCE AND TECHNOLOGY; (TO CREATE STANDING COMMITTEES ON SCIENCE AND TECHNOLOGY IN THE CONGRESS); TO ESTABLISH NATIONAL INSTITUTES OF SCIENTIFIC RESEARCH; TO AUTHORIZE A PROGRAM OF FEDERAL LOANS AND LOAN INSURANCE FOR COLLEGE OR UNIVERSITY EDUCATION IN THE PHYSICAL OR BIOLOGICAL SCIENCES, MATHEMATICS, OR ENGINEERING; TO AUTHORIZE THE ESTABLISHMENT OF SCIENTIFIC PROGRAMS OUTSIDE OF THE UNITED STATES; AND FOR OTHER PURPOSES

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LETTER OF TRANSMITTAL

MARCH 26, 1958.

Hon. JOHN L. MCCLELLAN,
Chairman, Committee on Government Operations,
United States Senate, Washington, D. C.

DEAR MR. CHAIRMAN: As directed by the committee in executive session on February 7, 1958, there is submitted herewith a detailed staff analysis of the proposed Science and Technology Act of 1958 (S. 3126). Included are summaries of the objectives of each of the provisions contained in the bill, and points which have been raised in opposition to certain sections of the bill.

The staff memorandum also contains explanatory information and supporting material relating to its provisions as drafted and submitted to the committee. Suggestions for amendments and certain revisions of the original bill are included in a redraft of S. 3126, at page 59.

In a joint press release issued by you, as chairman of the committee, and by Senator Hubert H. Humphrey, chairman of the Subcommittee on Reorganization,[1] it was made clear that the bill in the form in which it was filed in the Senate, as well as the proposed revision thereof, was prepared by the staff following a concentrated study of the need for reorganization of Federal science functions, initiated in August of 1957, under your joint direction. As stated in the release its provisions are tentative, since they have not been fully considered by members of the Committee on Government Operations and, following hearings, are subject to action by the committee, in the form of amendments, deletions, or the addition of new provisions or titles.

As originally drafted, the bill contained a title II which provided for the creation of standing committees on science and technology in the Senate and the House of Representatives. For reasons which are set forth on page 34, this title was omitted from S. 3126. It is contained, however, in committee print No. 2, dated January 17, 1958, and is also included in the staff draft of a proposed substitute for S. 3126, set forth on pages 63–66.

Since the bill was introduced, the Senate has adopted S. Res. 256, establishing a special committee which is authorized and directed to conduct a thorough and complete study and investigation with respect to all aspects and problems relating to the exploration of outer space and the control, development, and use of astronautical resources, personnel, equipment, and facilities. Under the provisions of this resolution all bills and resolutions introduced in the Senate proposing legislation in the field of astronautics and space exploration are to be referred to the special committee. A similar resolution, H. Res. 496, was adopted in the House of Representatives.

[1] Congressional Record, January 27, 1958, p. 851.

In the view of the staff, S. 3126, particularly title I and title II of the revised bill, relating to the creation of a department and standing committees on science and technology, as well as other provisions of the bill, would have a direct impact on the development of the program assigned to the special committees. The question has, therefore, been raised as to whether or not this committee can act on S. 3126, or whether it should be referred, in both its original and revised form, to the special committees for consideration and recommendations.

The special committee on astronautics and outer space programs in the Senate is composed of the chairmen and ranking minority members of six standing committees which deal with some aspects of science and technology. The staff believes that it would undoubtedly be helpful to the Senate leadership if that committee considered the problem of creating a Department of Science and Technology as well as the proposed creation of standing committees on science and technology.

As pointed out in the accompanying memorandum, information developed by the staff indicates that, in order that civilian science functions of the Federal Government may be administered properly in the manner in which Congress may determine, it is essential that there be a central agency designated to bring about the full coordination of all such programs. The staff also suggests that there is an equal responsibility on the part of the Congress to effect such reorganizations as may be necessary to study and develop the scientific programs of the Federal Government so that the functions of the various agencies engaged in activities relating to science and technology, or to astronautics and outer space exploration, may be considered in relation to one another and coordinated by legislative actions.

In the section of the staff memorandum dealing with areas of controversy over the proposed establishment of a Department of Science and Technology, it is emphasized that many scientists are opposed to such a proposal because of so-called political aspects. Although a number of conferences of scientists have been held recently under the auspices of various groups interested in studying the formulation of an adequate program for Federal support of science and technology, only negative discussions have resulted, and no specific remedial measures to correct existing deficiencies in Federal operations or constructive programs have evolved from any of these meetings insofar as the staff has been able to determine.

Although the free peoples of the world have never placed so much reliance on so few individuals, a majority of the scientists have so far resolutely refused to recognize their responsibilities and recommend appropriate remedial legislative action. Instead they have been content to retreat behind a screen of fear of our democratic processes. This memorandum, after developing the prevailing attitudes of scientists, endeavors to place emphasis on the responsibility of the Congress and the need for it to take the initiative in developing its own legislative program in the general public interest.

As it becomes more and more evident that proposals which scientists may advocate will be based upon knowledge of their special fields of science and the limited areas of their personal activity and the mainte-

nance of the status quo, in complete distrust of our system of government and without apparent regard for the need for an overall coordination of science programs under responsible administrative authority, it will become more imperative that the Congress act in the best interests of all the people.

The staff is aware that coordination of science cannot be accomplished by decree or fiat; that it should be effected by mutual understanding and exchange of ideas through a united and cooperative effort designed to develop the necessary administrative tools to get the job done. The negative attitude and lack of cooperation by the scientists, may compel the Congress to act on its own.

To emphasize this point, the following extract from an editorial which appeared in Life Magazine on March 10, 1958, relating to party responsibility in the Space Age, is cited:

> The Space frontier is pressing at our door insistently. * * * The biggest issue we have is the problem of assimilating the pace of scientific discovery into our social and governmental processes. The parties have barely nibbled at this. * * * Many of these issues sound technical, and they are. Scientists and technical experts proliferate around Congress these days like psychiatrists at a juvenile delinquency court. But the fact that a problem needs an expert's help is no reason to abandon it completely to him. On the contrary, it is the party's function in the democratic system to dramatize matters of national concern, *to act as the bridge between the expert and the voter who is supposed to be running the country.*

The legislation as proposed and submitted herewith is designed to provide the needed mechanism under normal executive branch controls. It would establish a focal point through which the scientific agencies of the Government would be afforded a medium for the coordination of their efforts into an intelligent and cohesive scientific program. Where exchange of information and mutual discussion does reveal the need for modification by administrative or legislative action, these can be achieved later by action on the part of the agencies involved or through the use of mechanisms provided in the proposed bill: the Department of Science and Technology, and the standing committees to be established in the Congress.

The proposed revision of S. 3126 is submitted so that all aspects of this legislative proposal may be considered by the Special Committee on Astronautical and Outer Space Exploration, as well as by the Committee on Government Operations. It incorporates the following major changes:

(*a*) The original title II in committee print No. 2, creating standing committees on science and technology in the House and the Senate, as proposed to be amended, would be restored, as title II of the revised bill.

(*b*) A revision of title I, to provide for the transfer of the functions of the National Advisory Committee on Aeronautics to the proposed new department, as an important aspect of the outer space control program.

(*c*) A revision and extension of the provisions of the original title V of committee print No. 2 (title IV of S. 3126) relating to overseas programs.

Title III of the revised version of S. 3126 deals with another highly significant aspect of the science needs of the Nation—the urgent need for adequate facilities and financial support for basic research. This would be accomplished by providing authority for the establishment or support by the Federal Government of research institutes or centers

in the physical and biological sciences, mathematics, engineering and the social sciences, to be operated largely by private, nongovernmental institutions, on a nonprofit basis with financial support from the Federal Government, or by the Government itself, under certain circumstances.

Title IV of the revised bill provides for the establishment of an educational loan program under which qualified students would be able to pursue studies in the physical and biological sciences, mathematics, or engineering. Adequate funds to carry on the program would be authorized, and provisions made that students who complete their prescribed courses of study may qualify for cancellation of their loans by accepting full-time employment in the fields mentioned above, either in any agency of the Federal Government or on any project or program designated by the Secretary of the proposed Department of Science and Technology. Remission would be at the same annual rate as the amount of the loan authorized.

Title V of the bill, as revised, would authorize the Secretary to utilize counterpart funds wherever available, for assembling, collating, translating, abstracting and dissemination of scientific data originating overseas. It would also authorize the use of such funds by other Federal agencies in the development of science and technology abroad, without reimbursement of such funds from appropriations. The title provides further that when agreements between the United States Government and foreign countries in which such funds are located are entered into by the Secretary of State, cooperative scientific projects may be financed through the use of such funds.

In addition to the staff material outlined above, there is also included in this committee print, as authorized by the committee in executive session, certain supporting data developed at the request of the committee by the Legislative Reference Service of the Library of Congress and other sources. These data are outlined at the beginning of the staff memorandum, in the accompanying table of contents, and in the introduction to those sections of the committee print.[2]

Respectfully submitted.

WALTER L. REYNOLDS,
Staff Director.

[2] See pp. V, 1, and 81–175.

PART I

SCIENCE AND TECHNOLOGY ACT OF 1958

STAFF MEMORANDUM 85-2-6

March 26, 1958

ANALYSIS OF PROVISIONS OF S. 3126, THE SCIENCE AND TECHNOLOGY ACT OF 1958; POINTS AT ISSUE; AND PROPOSED AMENDMENTS

The following is a detailed analysis of the bill, S. 3126, to create a Department of Science and Technology; to establish National Institutes of Scientific Research; to authorize a program of Federal loans and loan insurance for college or university education in the physical and biological sciences, mathematics, and engineering; to authorize the establishment of scientific programs outside of the United States; and for other purposes.

At an executive session of the committee, held on February 7, 1958, the staff was directed to (1) prepare an analysis of S. 3126; (2) point up sections of the bill to which opposition has been expressed, or which involve policy determinations by the committee; (3) develop information and supporting data from all available sources relative to the provisions of the bill to which opposition has been indicated (including the original title II of the Committee Print No. 2, January 17, 1958, providing for the creation of standing committees on science and technology in the Congress); and (4) summarize available data relative to the present status and operations of the science functions performed by various Federal agencies.

The staff was further directed to prepare this material for printing as a committee print for the use of the committee, and to include therein studies made at the request of the Committee by the Legislative Reference Service of the Library of Congress, as follows: (1) Development of the idea of a Department of Science; (2) an historical summary of activities of the National Academy of Sciences—National Research Council, with particular emphasis on the administration of fellowship programs; (3) information relative to the organization of science programs in Great Britain, Canada, France, Germany, Sweden, Belgium, Denmark, and the Netherlands under which civilian science activities have been brought together, as proposed under title I of S. 3126, as prepared by Dr. Wallace R. Brode, president of the American Association for the Advancement of Science, now in charge of the science attaché program of the Department of State; (4) an outline of the organization and operations of the Department of Scientific and Industrial Research in the United Kingdom; and (5) an analysis of legislation relating to the improvement of scientific study, teaching and progress in the United States, including a brief digest of legislation enacted into law.

This committee print sets forth the above material in the following order: [1]

[1] See table of content for detailed outline.

PART I

Title I. Department of Science and Technology:
Areas of controversy re the creation of a Department of Science and Technology.
Areas of controversy re proposed transfer of National Science Foundation to the Department.
Areas of controversy re proposed transfers from the Department of Commerce.
Committees on Science and Technology in the Congress
Title II. National Institutes of Scientific Research.
Title III. Educational loans.
Title IV. Overseas programs.
Proposed amendments to S. 3126.
Staff draft of a proposed substitute for S. 3126.
Title I. Department of Science and Technology.
Title II. Senate and House Standing Committees on Science and Technology.
Title III. National Institutes of Scientific Research.
Title IV. Educational loans.
Title V. Overseas programs.
Appendixes to staff memorandum:
A. Extracts from documents, articles, etc., relating to the operations of the Government in scientific and technological fields.
B. Scientific definitions.

PART II

Supporting material.

Title I. Department of Science and Technology

Section 101 of this title would create a Department of Science and Technology headed by a Secretary with Cabinet rank. Section 102 would authorize the appointment of a Secretary, such Assistant Secretaries as may be determined by the President to be necessary, and a General Counsel, by the President with the advice and consent of the Senate.

Sections 103, 104, and 105 extend to the Department general provisions of law applicable to all executive departments, including the use of an official departmental seal, and authority in the Secretary to delegate such functions as may be vested in him to such other officials or organizational units of the Department as he may designate.

Objective

The proposal to create a Department of Science and Technology has as its major objective the coordination and centralization of certain Federal civilian science functions now vested in agencies which carry on science activities and which have some general relationship, and should, therefore, be brought into closer cooperation with other similar or related activities of all Federal agencies operating in various fields of science and technology.

At the present time there are a number of independent agencies, such as the Atomic Energy Commission, the National Advisory Com-

mittee for Aeronautics, and the National Science Foundation, and components of existing departments, such as the National Bureau of Standards, Office of Technical Services, and the Patent Office, which are authorized to carry on or support major programs in the field of science. Efforts have been made in recent years to bring about better coordination of operating procedures in these scattered science activities. This was done through the appointment of special science advisers to the President, the establishment of the President's Advisory Committees on Science and Technology and on Government Organization, and the creation of the Interdepartmental Committee on Scientific Research and Development. Nevertheless, there continues to be an urgent need for better coordination of activities between these agencies and more than 30 other components of executive departments and independent agencies which are engaged to some extent in science activities.[2]

The centralization of certain of these agencies into a department under a Cabinet officer, without impairment of the basic objectives for which they were created, would, in the judgment of the staff, insure better coordination and proper administrative direction and control of civilian science programs of the Federal Government, at the Cabinet level.

The proposed transfers incorporated in this title would constitute only a skeleton departmental structure, and involve only those agencies performing functions which, the staff believes, clearly should be brought into closer coordination. Most of these agencies under their present structure could be improved administratively. There are undoubtedly others incorporated as components in departmental structures which have major functions that do not presently receive proper or adequate consideration as to their administrative and operating needs in the fields of science. In some instances they are isolated either by the nature of their programs or by the remoteness of their functions from the other components of the department and other Federal science activities. Studies conducted by the staff indicate that these agencies do not now receive proper program appraisals, which, in some instances, prevents them from performing their functions as authorized by the Congress. Nor do some of them receive the necessary administrative guidance and supervision as would be possible under a new department with the basic objective directed to developing and achieving full utilization of all Federal facilities toward essential advancements in science.

The present operating status or activities of agencies performing scientific functions in the Executive Office of the President, or under the direct control and supervision of the President, are not affected in any way by the provisions of the bill. It was considered that the determination as to any necessary changes in these operations should be left to the discretion of the President to effect the necessary direction, coordination, supervision, and control over the proposed Department of Science and Technology, and over all other activities directly responsible to the Chief Executive. Involved are such agencies as the Office of Defense Mobilization, Science Advisory Committee, t e President's Advisory Committee on Science and Technology, the President's Committee on Scientists and Engineers, the President's

[2] Organization of the Federal Government for Scientific Activities, National Science Foundation, No. 56-17; appendix A, p. 720.

Advisory Committee on Government Organization, the Office of Management and Organization (Bureau of the Budget), the Interdepartmental Committee on Scientific Research and Development, and the National Committee for Development of Scientists and Engineers.

NATIONAL SCIENCE FOUNDATION

Section 106 would transfer the National Science Foundation from its present independent status, with most of its functions remaining intact, to the new Department where such functions would be performed subject to the supervision and direction of the Secretary.

Objective

At present the functions of the National Science Foundation are carried on through a Director, who is under the guidance and policy control of a National Science Board, composed of 24 members eminent in the fields of science, education and public affairs, all of whom are appointed by the President and confirmed by the Senate. According to informed authorities who are familiar with the operations of the NSF, no major programs are undertaken by the Director without the approval of the Board. Thus, in instances where there may be a division among the members of the Board relative to the initiation of programs, delays are likely to be encountered and the Director may be handicapped in exercising his own judgment in the establishment of basic research projects. This organizational arrangement also interferes with the proper administrative and executive controls over the programs which the NSF is authorized to undertake, since there are, in effect, 25 officials who are responsible to the President for its programs and operations. Such a structure provides too much diffusion of authority. The objective of bringing the NSF under a centralized departmental structure, devoted to the development of science in the civilian field, is to insure that comprehensive and objective national programs in the promotion and support of basic science are initiated under an official of the Government who would have adequate administrative authority and who would be directly accountable to the President and to the Congress at all levels of operation.

TRANSFERS FROM THE DEPARTMENT OF COMMERCE

The Patent Office

Section 107 (a) would transfer all the functions of the Secretary of Commerce with respect to the Patent Office to the Secretary of Science and Technology. The Patent Office was originally in the State Department but on the formation of the Interior Department in 1849, it was made a bureau of that agency. In 1925 it was made an agency of the Department of Commerce where it has remained.

Objective

The Subcommittee on Patents, Trademarks and Copyrights of the Senate Committee on the Judiciary has made extended studies into the present operations of the Patent Office and has proposed that it be constituted as an independent agency. A bill was introduced to carry out that recommendation.[3] The chairman of that subcommit-

[3] S. 1862, 85th Cong.

tee, Senator Joseph C. O'Mahoney, in response to an inquiry regarding the need for this proposed legislation, commented on the background and purpose of the bill as follows:

> The advisability of making the Patent Office an independent agency has been raised many times throughout the years. In 1812 a committee, which was appointed by a resolution of the House to inquire into the state and condition of the Patent Office, discussed the question of making it an independent agency. In 1852 the proposal was discussed again. In 1912 and 1913 Commissioner Moore recommended the establishment of the Patent Office as an independent agency.
>
> In the 62d Congress a bill was introduced to establish the Patent Office as an independent agency. The House Committee on Patents held hearings on a similar bill in the 66th Congress.
>
> Aside from legislative proposals, many prominent statesmen and writers have on various occasions urged that the Patent Office be made independent. For example, Senator O. H. Platt (Connecticut), in a Senate speech in March 1884, stated, "I say that the Patent Office should be made an independent department." Richard Spencer, in his book The United States Patent System With a Complete Program for Its Improvement and Simplification (1931), devotes an entire chapter (pp. 102–112) to the subject and makes the recommendation that the Patent Office should be an independent agency. * * *
>
> It is my personal belief that the separation of the Patent Office from the Department of Commerce and its establishment as an independent agency would be advisable and in the public interest. The inquiries and studies of the Patents Subcommittee show that the Patent Office has not functioned well under the present arrangement. In past years, the Commerce Department has not undertaken to see that the Office had sufficient money or manpower to maintain an efficient standard of operation and as a result, the Office is far behind with its work. It now has a backlog of approximately 217,000 cases and it takes an average of 44 months between the date an application is filed and the date the patent, if one is granted, issues. This time lag is discouraging to inventors—particularly the independent inventor with limited financial means. If the United States is to prevail in the technological race with the Communists countries, it is imperative that our present system be made to work more efficiently, and, in my opinion, a modernization of the Patent Office is the first step toward improving the patent system.

The staff of this committee agrees that the Patent Office has little administrative guidance from the Office of the Secretary of Commerce; proposed programs and needs are not fully evaluated; and, according to information available, there are indications that the patent procedure and protective program need a complete reorganization. The staff has also been informed that there is no opportunity for the Com-

missioner of Patents to present to the Congress advanced programs for the protection of patent holders or for the full utilization of patent information and techniques which would contribute materially to the development of the science activities of the Government.

It has been suggested that this section of the bill should eliminate the administration of trademarks so that this service would continue to be under the control of the Secretary of Commerce, since this function is not directly related to science or technology and is concerned primarily with industry and commerce. Consideration should be given to the adoption of such a perfecting amendment.[4]

Office of Technical Services

Subsection (b) of section 107 would transfer to the Department of Science and Technology all of the functions of the Secretary of Commerce now being administered through the Office of Technical Services, as well as all other related functions vested in that department under the provisions of the act of September 9, 1950. This subsection also provides that the Office of Technical Services be elevated to the status of a bureau in order that it may be organized properly to assume expanded functions as provided in the bill.

Objective

The Bureau of Technical Services would be authorized, under the supervision of the Secretary, to establish a complete science information program. Most of the functions prescribed in the bill are already vested in the Secretary of Commerce, but, according to information available to the staff, the authority has not been fully utilized. These authorizations are proposed to be reenacted in S. 3126, in order to place special emphasis on congressional intent and to expand these and related functions on a level necessary to meet current needs.[5]

This section of the bill also proposes to vest in the Secretary of Science and Technology, and, through him, in the Bureau of Technical Services, additional authority to encourage and arrange for the declassification of scientific information when determined to be in the national interest and consistent with security requirements. Although recognizing the need for setting up proper machinery to accomplish this objective, the general standards and limitations with respect to preserving the security classification of any scientific or technical information coming under the control of the Department, as prescribed under the provisions of the act of September 9, 1950, have been retained. In the view of the staff they are now unnecessarily restrictive, but must be fully evaluated before any specific language is included for amendments to modify them, in the interest of security.

It is proposed, therefore, that consideration be given to the establishment of a Board of Evaluation, either within the Department or the Bureau, in order that review and advisory powers on classification of scientific data may be fully vested in the Secretary of the new Department, and information which is of value to other departments of the Government, and to scientists, shall be made available without the continuation of unnecessary classification restrictions.[6] The objective of such a provision would be to encourage the removal of many of the stiffling security restrictions, which may have the effect

[4] See proposed amendment No. 5, p. 57.
[5] See proposed amendment No. 13, p. 58.
[6] See proposed amendment No. 6, p. 57.

of preventing American scientists, educators, and officials of our own Government from obtaining scientific information and data which is already in the possession of scientists and officials of all potential foreign aggressor nations.

In considering this problem, it may be necessary for the committee to recommend appropriate amendments to basic acts authorizing classification or declassification, which would tend to encourage the agencies primarily responsible for the classification of such information—the Atomic Energy Commission and the Department of Defense—to establish similar boards, or to improve upon the operations of any existing declassification procedure, in order that effective cooperation between these agencies may be insured.

Collation and dissemination of scientific information

Subsection (b) (4) proposes to give the Bureau added responsibility for the development and utilization of the latest mechanical aids and new devices for collating, translating, abstracting, indexing, storing, and retrieving scientific and technological information under the control of the Federal Government, and to coordinate such data available from other sources.

Objective

In carrying on these and other functions as now vested in the Department of Commerce, the Office of Technical Services, or the proposed Bureau of Technical Services, provision is made that the Bureau may supplement and support services provided by non-Government sources in the field of assimilating and disseminating scientific information.

Certain private translating and abstracting agencies and centralized scientific libraries have raised the question as to whether this should be a function of the Federal Government, or whether it would be preferable that this program be carried out under an independent centralized indexing agency established by and with the financial support of private industry and the Government. It is understood that the major abstracting services have agreed to join together in a centralized federation to perform these services, which proposal should be carefully considered by the Congress.[7] This is a matter of policy, which is treated in detail in the section of this memorandum dealing with areas of controversy on proposed transfers from the Department of Commerce.[8]

At the invitation of the Council on Documentation Research and Western Reserve University, some 120 representatives of organizations interested in documentation and information services in science and technology met in Cleveland, Ohio, on February 3–4, 1958, to consider a plan for the creation of a national center for the coordination of scientific and technological information. As a result of this discussion, it was recommended that the National Academy of Sciences—National Research Council, be requested to appoint an ad hoc committee to study the problems developed at the conference and to formulate a plan which would meet with the approval of and insure the general support of the Federal Government, the professions involved, and the industries affected.

[7] See proposed amendment No. 7, p. 57.
[8] See pp. 25–33.

Additional authority would be provided to the Bureau of Technical Services to undertake, through the facilities available to the Secretary, including education and scientific research institutions and private libraries, the establishment of such additional services as may be required to further scientific, engineering, and technological research and to aid in the development of inventions, discoveries, products, processes, and techniques. It is contemplated that an organization would be established within the Bureau with the function of evaluating patent applications, patents, inventions, and various techniques which might, if fully developed and disseminated, contribute to the advancement of science and technology.

This proposal was thoroughly evaluated by this committee (then the Committee on Expenditures in the Executive Departments) in the 80th Congress, in connection with its consideration of S. 493, a bill to provide for the coordination and dissemination of technological and scientific information, and for the more efficient and orderly administration of a program to make the discoveries of engineers, inventors, and technicians more readily available to American industry and business.[9] After hearings, which continued for 10 days during May 1947, the committee reported an abbreviated bill which was approved by the Senate but failed of final action in the House of Representatives. In the succeeding Congress, a substitute version of S. 493, as originally introduced, was approved as The Technological and Scientific Act of 1950, on September 9, 1950.[10]

This act, while not carrying out the original objectives of the bill as reported by this committee, did, nevertheless, authorize the Secretary of Commerce to establish a central clearinghouse for technical information. The act, however, restricted its use primarily for the benefit of American industry and business, with too little emphasis on the necessity for assembling, translating, analyzing, abstracting, and disseminating scientific data from foreign sources. The act also omitted any provisions for the development of patents, new technology, or techniques.

The immediate objective of the committee in reporting S. 493 in the 80th Congress was to enable the Secretary of Commerce to set up the necessary machinery to evaluate fully the vast amount of technical data and scientific information assembled earlier by representatives of the United States Government following behind the Army of Occupation in Germany during and immediately after the close of World War II, so that it could be made available to American industry. The bill further provided that, if an examination by competent scientists skilled in the fields to which the seized documents related, found that these documents offered a means of promoting advancements in science and technology, appropriate steps would be taken to have such data translated, abstracted, developed, and disseminated for industrial use.

The bill further provided in specific terms for the evaluation of patents, inventions, and various techniques. If it were determined that information obtained abroad or from domestic sources had potential scientific or technological value, the OTS would have been authorized to have it developed for industrial use. This provision would have authorized the use of the facilities of governmental or private research laboratories for the evaluation and utilization of such

[9] See p. 167 of pt. II for further details.
[10] S. 808, H. Rept. 2356, Public Law 776, 81st Cong.

technology as was developed with Federal funds to be made available for this purpose.

Subsection 107 (b) would implement this program in general terms and would enable the Secretary of Science and Technology to provide for better protection to holders of patents as well as encourage the development of the full potential and utilization of all patent information.

National Bureau of Standards

Under subsection (c) (1) of section 107, the National Bureau of Standards would be transferred to the Department, together with all of its functions, which would be administered under the supervision and control of the Secretary.

Objective

The National Bureau of Standards was originally created in 1901, primarily to establish standards of weights and measures. Its functions were expanded when the Department of Commerce was created on March 4, 1913, in order to enable it to perform additional services for industry and commerce. Since that time it has further expanded its scope of operations to include the development of programs in research in the physical sciences. These programs were initiated primarily at the request of other Federal agencies or under contracts from industry, without any specific guidance or control from the Secretary of Commerce. There has apparently been little or no evaluation of the functions of the NBS in relation to new scientific and technological developments by the Department of Commerce, which is primarily concerned with carrying on its other functions in economics, business, industry, transportation, and services related to commerce generally.

As has been indicated in the case of the Patent Office, the NBS has not had a full opportunity to present its own program or needs directly to the Congress, nor has the Director been provided with adequate authority to develop scientific programs or to eliminate from the Bureau activities which have reached an operating status and should no longer be continued under its control.

The staff, therefore, after consultation with informed persons concerning the operations of the Bureau, recommended that the Bureau of Standards be taken out of the Department of Commerce, and that certain of its activities which have now reached the operating stage, such as the radio and cryogenic laboratories at Boulder, Colo. (subsec. 107 (c) (2)), should be set up as separate operating components within the proposed new Department.

ATOMIC ENERGY COMMISSION

Section 108 provides for the transfer of the Atomic Energy Commission to the proposed new Department, where it would continue to exercise its functions subject to the supervision and direction of the Secretary.

The bill also provides that the Atomic Energy Commission be changed to the Atomic Energy Administration. The generally accepted nomenclature in the Federal Government normally indicates that a commission is an agency which performs regulatory and quasi-judicial functions, whereas an administration is an operating com-

ponent at a level higher than a bureau or service status. The objective in proposing a change in the nomenclature in the designation of this agency is to bring about better uniformity and to clearly identify the nature of its operating status.

Objective

Practically all officials and scientists consulted in connection with the drafting of the proposed legislation were of the opinion that, if the Congress approved the creation of a Department of Science and Technology, the present Atomic Energy Commission should be one of its principal components. These authorities took the view that it should continue as a civilian operation outside of the Department of Defense, as already determined by the Congress, which status would remain unchanged if transferred to the proposed new Department, except that it would be administered under the general supervision and direction of the Secretary.

TRANSFERS FROM SMITHSONIAN INSTITUTION

Section 109 of the bill provides that all of the operating functions of the Smithsonian Institution, except those relating to the operation of museums, for which it was originally created by private funds, and of the Washington Zoo, should be transferred to the new Department.

The functions proposed to be transferred from the Smithsonian Institution to the Department of Science and Technology include: The Division of Astrophysical Research, the Division of Radiation and Organisms, certain functions relating to the Canal Zone biological area, and certain functions relating to the exchange of scientific publications being administered through the International Exchange Service. Any other functions of the Smithsonian Institution determined by the Director of the Bureau of the Budget to relate primarily to scientific research would also be transferred by the bill.

Objective

The objective of this section is to coordinate these activities, either through the creation of appropriate components within the new Department, or through the transfer of such functions to other components of the Department.

Authorities consulted regarding this section of the bill generally agreed that if a Department of Science and Technology were to be created, these functions should not be carried on through an agency such as the Smithsonian Institution, originally endowed by private funds for museum purposes, but should be brought under the direct supervision of the Secretary in order that they may be properly coordinated with other science activities of the Department.

MISCELLANEOUS PROVISIONS

Sections 110, 111, 112, 113, 114, and 115 relate to general authority required in connection with the establishment and operation of a new department. They involve the transfer of personnel; the continuation of existing rules and regulations effective at the time of the transfer until modified, superseded, or repealed; expenditure authorization; reports to Congress; statutory and departmental succession; appropriation authorization; and the effective date of the various sections contained in title I.

OTHER PROPOSED TRANSFERS TO THE DEPARTMENT OF SCIENCE AND TECHNOLOGY

In addition to the activities proposed to be transferred to the new Department as above outlined, if favorable action is contemplated, consideration should also be given to the desirability of transferring certain other agencies to the new Department. These include the National Advisory Committee for Aeronautics; the Coast and Geodetic Survey and the Weather Bureau (Commerce); the Airways Modernization Board; the Bureau of Mines, the Geological Survey, and the Office of Saline Water (Interior); and, possibly, some other science functions performed by agencies now operating within the Departments of Interior; Commerce; Agriculture; and Health, Education, and Welfare, as well as certain other aspects of science programs now vested in independent agencies.

National Advisory Committee for Aeronautics

The staff recommends that serious consideration be given to the transfer of the National Advisory Committee for Aeronautics to the new Department, in view of recent programs advanced for the exploration and control of outer space.[11] This agency was not included in the original bill in view of the fact that part of its activities are supported through contract payments from aircraft manufacturers, and it was the view of the staff that further policy determinations would be required before it should be included within the new Department. In view of later developments, however, and the various proposals that have been made with reference to the location of basic and applied science programs relating to outer space development, such independent organizations as the NACA, the AEC and the NSF would be directly involved and should be coordinated in the new Department, which would then automatically, in the view of the staff, be authorized to exercise jurisdiction over the program if it is to be operated by a civilian agency rather than by the military. Under a proposed revision of S. 3126 [12] the NACA would be brought into the new Department on the same basis as the NSF and the AEC.

Department of Defense

The staff has also been informed that even within the Department of Defense there are certain functions now being performed, in basic science areas, which might be considered for transfer to some central civilian agency engaged primarily in that type of activity. For instance, although the staff has made no study of the problems involved in connection with these programs, information has been received to the effect that the research and development groups within the military departments are devoting a considerable amount of time to studies relative to the physical and biological sciences which are basic in nature. It has been represented to the staff that, if these functions were transferred to a new department, as proposed, proper coordination could be effected for full military utilization of information developed therein, leaving the technical staffs of the military departments free to devote their entire time to technological developments and applied science problems relating directly to military application.

[11] See proposed amendment No. 2, p. 56.
[12] The revised bill, p. 61, provides that the NACA be transferred to the new Department.

In support of this proposal, Dr. I. M. Kolthoff, head of the School of Chemistry, the Institute of Technology, at the University of Minnesota recently stated in a letter to the chairman of the Subcommittee on Reorganization that, "fundamental research, sponsored by several agencies of the Armed Forces should be transferred to, or coordinated by, the Science Secretary."

In a speech in the Senate recently,[13] Senator Mike Mansfield commented as follows concerning basic research performed by the military departments: "In matters of advanced scientific and technological research, the Defense Establishment may play a distinguished part, and research of this kind may have military applicability. Generally speaking, however, it is not the best site for the control and direction of creative scientific research."

Other science activities

On the other hand there are certain science activities now being conducted under the supervision of other departments of the Government, which, in the view of the staff, should retain their present status. The two major activities in this category are the National Institutes of Health, and the Agricultural Research Service. It is the view of the staff that the operations of the National Institutes of Health should remain as a part of the Department of Health, Education, and Welfare and under the direct supervision of the Surgeon General of the United States. From a brief study and analysis of the operations of the Institutes of Health, the staff reached the conclusion that these programs were being operated effectively under the direct supervision and control of doctors of medicine.

Likewise, after giving consideration to proposing the transfer of agricultural sciences to the new Department, officials familiar with these activities convinced the staff that, although the newly enlarged program relating to the utilization of surplus agricultural commodities might be held to be more industrial research than agricultural, and on this basis should be transferred to the new Department, the most important of its activities were directed toward benefiting agriculture generally. It was also pointed out that, in the development of a program for utilization of surplus agricultural commodities, many of the present functions of the Department of Agriculture, such as those of the Bureaus of Plant and Animal Industry, were essential to the successful operation of this program. The same general considerations apply to the Forest Service and other science activities of the Department of Agriculture.

As provided in other sections of this title, the Secretary of Science and Technology would be required, through the proposed Bureau of Technical Services, to effect complete interchange of scientific information between all such scientific activities in other departments of the Federal Government which, of course, would include information relating to the operation of science programs and functions now vested in the Institutes of Health, the Agricultural Research Service, and the Forest Service, as well as other departmental services such as the Fish and Wildlife Service in the Department of the Interior and the Coast and Geodetic Survey and Weather Bureau in the Department of Commerce.

[13] Congressional Record, Feb. 10, 1958, p. 1671.

AREAS OF CONTROVERSY RE THE CREATION OF A DEPARTMENT OF SCIENCE AND TECHNOLOGY

Objections on the part of some officials of the Government and authorities in the fields of science have been made to title I, providing for the creation of an executive department on science and technology, on the basis that it would inject politics into science activities. Thus, it has been contended that the establishment of such a department would bring scientists under bureaucratic control, which would be detrimental to the performance of the functions for which they alone are qualified, and the need for which they are best able to determine. Objections have also been made to diverting the emphasis now placed upon advisory and consultant groups concerned with science activities and the provisions of the bill which might result in transforming them into operating components.

Although many scientists recognize the advantages that would accrue, primarily through the development of integrated science programs, as a result of the creation of a department and its enhanced position with Cabinet representation, some of them, nevertheless, oppose the creation of such a department at this time, on the premise that a Secretary of Science and Technology, who would be a political appointee, would administer programs which should be under the complete control and jurisdiction of scientists.

Except for certain specified areas, especially in the regulatory, veterans and general services fields, the major functions of the Federal Government are presently carried on under departmental structures headed by political appointees who are directly responsible to the President. The implication that a secretary of science and technology would be appointed for political reasons, without regard to the essential requirements that he should have full and comprehensive knowledge and training in the administration of scientific programs, is an unfair indictment of the President, any President, before the fact. These opponents of the program fail to consider that political parties provide the constitutional medium through which the people themselves express their will, and the President, once he is elected by the people, has the responsibility for formulating and carrying out programs of his party as approved by the people when he determines that they are in the best interest of the Nation, regardless of political considerations.

The contention that any Secretary of Science and Technology should necessarily be a scientist is based upon exactly the same argument advanced by the representatives of health and education groups when the Department of Health, Education, and Welfare was considered by the Congress over a period of 7 or 8 years. It was argued at that time that any department in the fields of health and education would, of necessity, have to be headed by a doctor of medicine or by an outstanding educator; otherwise the country was doomed to have socialized medicine and/or federally controlled education. The proposed National Institutes of Health were looked upon originally as being a step toward Federal control over all health activities, under which doctors would be placed in an inferior position, subject to the dictation of political appointees or bureaucrats. A brief analysis of the operation of these functions within the Department of Health, Education, and Welfare has revealed that all of these fears were

unfounded, and that, at least as far as the staff has been able to develop the facts, doctors and educators are in full control of their respective programs, although they are administered under the supervision and control of the Secretary of Health, Education, and Welfare.

It would be inconceivable that any President would appoint an official to such a high office as Secretary of Science and Technology who did not have the administrative and executive qualifications necessary to avoid what the scientists fear, by appointing qualified persons to assume direct responsibility over programs set up in the respective fields of science. The Secretary would undoubtedly find that, in the interest of efficiency and proper operating procedures, he should restrict his authority to supervision, general administration, coordination, and integration of information relating to all operating phases of such programs as may be brought under his control, and toward improvement of their relationship with other Federal and private science agencies or institutions.

Former Senator William Benton, who has been very active in promoting the advancement of science in this country, made specific reference to the part "politicians" will be required to play in the formulation of a national science program at a national conference held at Yale University on February 3, 4, 1958, under the sponsorship of the President's Committee on Scientists and Engineers and the William Benton Foundation, from which the following is quoted:

> I am told that a debate is now going on among the natural scientists about how to win greater public understanding for science. One group contends that the effort should be directed primarily to intellectuals. Another group holds that the target must be the general public. I suggest that both are wrong, that the starting point and the focal point should be the politicians.

In a recent communication addressed to the chairman of the committee, Charles C. Cabot, Jr., of Boston, Mass., pointed out that—

> coordinating the new scientific and technological advances with the proper governmental control and regulation is surely one of the major problems facing us today, and I think that your bill is a good step in the right direction. I have felt for several months now that the civilian aspects of space research and travel as well as the administrative tasks of the Atomic Energy Commission should be administered by one man with Cabinet rank. This Department could also coordinate the vast scientific research projects now being carried on in the United States under various and sundry auspices.

Commenting specifically regarding the prevailing attitude of scientists against what they term to be "political control," as the result of a study of the functions of the AEC in 1957, Mr. Cabot states:

> One of the principal reasons for establishing an independent commission to run our atomic affairs was the feeling that the job should be done in an atmosphere free of political pressures. I question the reasoning behind this. Much of the strength of our democratic system lies in the fact that most major governmental decisions are political. The more

important the decision and the more people it affects, the greater the need ordinarily that it be made in a climate where the will of the people can be brought to bear. * * * My point is that vital policy questions not requiring secrecy should be made by officers with political responsibility. To ridicule this view is to ridicule our form of government.

The decision to commence a thermonuclear "crash program" was certainly of far-reaching importance. It is fundamental that elected political officers, or subordinates for whom they must bear responsibility, deal with questions of such momentous nature, and as I have suggested this will inevitably be the case. Placing responsibility for such vital matters on an independent commission, free of any political responsibility, indicates a surprising lack of faith in our system of elected government. * * * Of course, a department head is not elected, but few will deny that he is not subject to far more popular pressure and criticism than an independent commissioner. In addition, the President is held responsible for his department heads, further insuring political responsibility.

To illustrate the general attitude of scientists on this point, the following is quoted from an article entitled "Survival in an Age of Technological Contest" by Dr. T. F. Walkowicz, a recognized authority in the technology of aeronautics.[14]

* * * The world has now entered upon the scientific age, marked by a technological war between the United States and the U. S. S. R. which the Soviets are winning by an inspired pioneering spirit and by our default. Since the end of the last war, Soviet science has forged ahead unrelentingly. During the same period, American science has been slowly bogged down by a bureaucracy which places major emphasis on administrative tidiness, and insufficient emphasis on producing results.

* * * The race for the conquest of space is today's major engagement in the technological war; we must win it, for the nation which dominates the air spaces will be in a position to dominate the world. * * *

Instead of having security with solvency, we are heading toward insecurity and insolvency, because we have not adjusted our defense organization to the incredible advances in new weapons technology. * * *

* * * At least one Cabinet-level officer should be an outstanding technologist-statesman, whose career has been in the dominant technology of the period. * * *

Initially, this Cabinet-level officer might be a special assistant to the President for science with membership on the National Security Council and the President's Science Advisory Committee. Eventually, it might prove wise to set up a Department of Science, with Cabinet representation.

The science Cabinet officer would become the focal point for formulating national science policy, and for such agencies

[14] Congressional Record, Jan. 30, 1958, pp. A861-864.

> as the National Science Foundation, National Bureau of Standards, National Advisory Committee for Aeronautics, etc.
>
> The writer can readily think of 10 outstanding men (some Republicans and some Democrats) who could qualify intellectually and politically for the position described above. Each of these men has the humility to get advice from other scientists when dealing with problems outside his own field; each is too wise to try to centralize under his own control the Nation's scientific effort, for each knows that centralized control is anathema to scientific progress. * * *

This typifies the views of many scientists, who recognize the need for better organization and integration of Federal science activities, yet are fearful that they will offend some of their fellow scientists who are constantly preaching that any constructive or workable reorganization of Federal science functions will isolate them from the operations of the program and that they will then be subordinated to some nebulous political domination and control of a Cabinet officer, and, by inference, by a politically minded President.

To illustrate further, an outstanding authority who is familiar with the general attitude of scientists in regard to Federal reorganization of science activities informed the staff of the committee that, in his opinion, there should not be attempts made to bring about the creation of such a Department, concluding that "this is really an invitation to civil war." He further suggests that the position of Special Assistant to the President for Science, to which Dr. James R. Killian, Jr., was recently appointed, should be "established by law," and that it should be adequately staffed so that it could "reach into the various departments (including the Defense Department) through effective committees."

Any such action by the Congress would be considered an infringement on the President's prerogatives, since it has been the legislative policy to permit the President to organize the staff of the Executive Office of the President in any manner in which he determines to be in accord with his program or in the public interest, without interference from the legislative branch. To create such an office, as recommended, would also have the effect of removing a statutory Federal agency entirely from the jurisdiction of the Congress.

The opposition that has come to the attention of the staff to the creation of a Department of Science and Technology has been based on the contention that its creation would impede the research of individual scientists. It has, therefore, been suggested that, if the Department is to be created, the bill should contain a clear declaration of policy, as to the congressional intent regarding its functions and purpose; that the word "scientist" should be so defined that able scientists who may not have specific degrees in designated sciences would not be disqualified; [15] that adequate provisions should be made to encourage and support individual scientists who may have proposals which have tremendous potentials but are not approved as official projects either by the Government or by educational institutions; and that the provisions of the bill should be restricted to apply only to the physical sciences—that the social sciences (incorporated in title II) should be included in some other agency. These policy problems will require congressional determinations.

[15] See proposed amendments No. 9, p. 57.

Another important phase of the proposed program, to which the Congress must give careful consideration, is stressed by Dr. Harvey I. Fisher, chairman, department of zoology, Southern Illinois University, in a letter to the chairman of this committee, as follows:

> Many scientists, including myself, are concerned with recent developments which indicate increased emphasis on science. First of all, we are pleased that our area of interest and life work is receiving some attention.
>
> However, the trend seems to be to equate "science" and "technology." We must never let the latter emphasis develop at the expense of pure or basic research. Much of the present-day research that is termed "basic" is basic only to the application of science. There must be a clear understanding of the meaning of basic research and a proper balance between the "pure basic" and the "applied basic." Technology soon withers without a foundation of continuing pure research; we have already observed this in the United States.
>
> Another probable danger in our present trend is that certain sciences, largely physics and chemistry, will develop out of proportion to others such as biology and geology, for example. Real evidence of this danger is at hand when governmental agencies indicate preferences for one science over another in terms of salaries and moneys for research. This has happened twice in the last year or so.
>
> Lastly, I should like to point out that, as much as scientists want science to receive its fair share of emphasis, we do not want science, and particularly technology, stressed at the expense of other liberalizing subjects in the humanities.

The above-cited points, which of necessity include only a partial presentation of the arguments that will be raised at hearings held on the bill, clearly emphasize the tremendous problems that are involved in the development and coordination of fundamental or basic research programs. The creation of a Department of Science and Technology, as proposed in S. 3126, would provide the means of bringing civilian scientific activities of the Federal Government and industry into a central focus comparable to the existing facilities in these fields in European nations. It is generally recognized that a great measure of our basic science has been developed abroad, or through programs finalized in this country with the help of scientists educated abroad, including nuclear fission, thermonuclear weapons, long-range ballistic missiles, and satellite development.

The final end product has, on the other hand, been produced through applied science and technology, in which the United States has excelled. The provisions of S. 3126, taken together as a Science and Technology Act, will, in the view of the staff, enable this Government to bring about a proper balance in science, by permitting advancements in basic or fundamental sciences in this country and technology or applied science in friendly nations which participate in the programs authorized by the act.

Mr. John C. Honey, former study director of the National Science Foundation, and now executive associate, Carnegie Corporation of

New York,[16] after examining the provisions of S. 3126 and supporting material, commented on its provisions and objectives, as follows:

> The organizational features of the bill are extremely interesting and in line with some thinking which I have given to this problem in the past. While in recent testimony before the Subcommittee on Fiscal Policy I urged the establishment of a Council of Science Advisors in the Executive Office of the President, in order to provide the President with the kind of guidance which would permit more effective leadership in matters scientific, the proposed Department would, of course, in some respects go further in meeting this objective. For the President would have as a member of his first-rank official family, a Cabinet officer with major operating, and presumably policy responsibilities for scientific affairs.
>
> It is with respect to this latter point that I think the bill could profitably be strengthened. It would seem to me of value to clearly state that the Secretary of the Department of Science and Technology has within his purview the responsibility for the identification of major issues of national science policy and for taking the necessary steps to see that these issues are appropriately met. Under the present bill, it appears that the Secretary of the proposed Department would be operating a kind of scientific holding company. As I am sure you are aware, the history of several of the Federal Departments has been one of struggle on the part of the Secretary in charge, to create an integrated, cohesive, and long-range program in the functional area of his concern. Without an explicit statement of this kind of responsibility for the new Secretary, he might be faced with a long and costly struggle to assert his leadership.
>
> The history of the Federal Government's role in science to date has been marked by periodic attempts to create a locus of responsibility for Federal policies related to science. As you know, the National Science Foundation was, in part, created for this purpose, but has been successful only in a very limited way in meeting its policy responsibilities. This has occurred for a variety of reasons related to weaknesses of leadership, diffusion of functions, difficulties in the language of the act creating the Foundation, and dual responsibility at the top of the organization, in the form of a Director appointed by the President, as well as a Board of Directors also presidentially appointed. In addition to the policy responsibilities now within the Science Foundation's purview, broad security-oriented science policy responsibilities reside in the Science Advisory Committee, which until recently was housed in the Office of Defense Mobilization. There is also an Interdepartmental Committee for Scientific Research and Development which, under its enabling Executive order, has certain duties of a policy character. The Chairman of the Atomic Energy Commission serves in an advisory role to the President on science policy related to atomic energy affairs. And finally, the National Academy of Sciences-National Research Coun-

[16] See appendix A, for extracts from a recent article by Mr. Honey relative to Federal Government organization and programs for research and development, p. 75, and pt. II, p. 97.

cil, which is, of course, quasi-governmental, can serve the Government with respect to science policy issues when so requested.

If order is to be brought into this picture of diffused policy responsibility it would seem to me that the bill creating a Department of Science and Technology should forthrightly state the policy responsibility of this Department and its Secretary. There would be advantages, too, in clarifying what, if any, the policy roles of the agencies to be placed in the new Department will be. It would seem that the present advisory role of the Chairman of the Atomic Energy Commission could be eliminated as could be the broad policy responsibilities of the National Science Foundation. The Interdepartmental Committee for Scientific Research and Development could be designated to serve in an advisory capacity to the Secretary of the new Department. Similarly, I should think that the Science Advisory Committee, which brings together the highest nongovernmental scientific talent of the Nation, could also serve in an advisory role to the Secretary of the new Department.

One of the functions of the National Science Foundation which has never been adequately performed is that of providing coordination of the Government's scientific efforts. A very large number of agencies are dealing in one way or another with the scientific manpower problem, the problem of disseminating scientific information, and other activities of great import to the national scientific effort. While the bill goes far toward fixing responsibility in the new Department for the development and dissemination of scientific information and for the handling of scientific manpower problems, it would seem to me worthwhile to have the act clearly state the broad coordinating responsibility of this new Department over these science activities as well as others.

I should hasten to add that I would be vigorously opposed to seeing any Department of Science and Technology become the locus of research programs which receive their major impetus and direction from the functional departments with which they are associated. For example, it would seem unwise to place agricultural research activities in the new Department and I would doubt the wisdom of moving the Geological Survey out of the Department of Interior. On the other hand, a research outfit like the Advisory Committee for Aeronautics, while it contributes importantly to the military, is concerned with aeronautical research of importance to the whole economy. It could logically, I believe, be incorporated in the new Department. Perhaps, however, it would be an act of political wisdom to create the Department without attempting to incorporate in it at this time all of those units which might ultimately more logically be placed there.

Finally, I am wondering what the relationship of such a new Department will be to Dr. Killian's operation. If the Secretary of the Department is to serve as the President's

principal science adviser in the same way that the Secretary of Agriculture serves as the President's principal adviser on agricultural affairs, it would not seem necessary to have a special assistant on science.

On December 2, 1957, Dr. Wallace R. Brode, president of the American Association for the Advancement of Science, in response to a request from the staff, submitted the following suggestions as to Federal agencies which should be included in a Department of Science:

I believe that a position of Cabinet level should be created in science and humanities which should be a cultural segment of our national life. Great care must be taken to avoid the word "education" lest the "professional" educators try to seize the ball and run with it. Parts of science and humanities or arts may well remain in certain parts of the present structure, as plant research in Agriculture and military research in the military agencies.

Attention should be called to the fact that many nations include building and housing research as an important separate establishment. We have only a small division in the National Bureau of Standards in this area and such agencies as Housing and Home Finance have no facility. There should be a service in this area and on a level with other equivalent laboratories.

The proposed research establishment on the utilization of surplus agricultural products as described in Senate Document 45, 85th Congress, should be incorporated in the broad program of a science department.

It is difficult to draw sharp lines of separation as to what areas should be included or excluded and in some cases only a portion of the activity should be transferred to the new Department. This is particularly true of the basic research support programs of the Office of Naval Research, Office of Ordnance Research, and Office of Scientific Research. Unclassified basic research and education should not be a function of the military organization.

I believe that in addition to the agencies in your appendix A, one should consider the inclusion in this group of Atomic Energy Commission, National Advisory Committee for Aeronautics, Forest Products Laboratory, Coast and Geodetic Survey, Geological Survey, Food and Drug Laboratories, National Institutes of Health, and National Library of Medicine.

It has been demonstrated that the combination of science and culture are both compatible and efficient in the Smithsonian Institution with its laboratories and art galleries. Universities also combine these areas. It should seem to me that the combination of the national library facilities, together with an expanded collection, translation, indexing, abstracting, and distribution system would be an important function of this Department of Science and Arts.

The support of research, teaching, and educational programs form another important area in which it is not practical to separate science and humanities. Care must be taken not

to call this a Division or Bureau of Education since the professional "educators" who are concerned with methodology should gain control. It is not possible to create an efficient educational system with support for a limited area of science and neglect of the other areas essential to our broad educational program.

There is considerable need in this country for a national recognition of art, music, drama, and literature and much assistance could be given by a governmental agency.

It is expected that all of the agencies in this proposed Department of Science and Humanities would be headed and staffed by accepted experts and personnel who would be singularly free from political or commercial bias or influence and that adequate safeguards would be established to preserve such independence.

Summation

This title, if enacted into law, would permit a civilian official of Cabinet rank to bring together several of the major governmental science functions into a single agency. This would enable each service to be fully utilized in the development of a concerted effort for the formulation of scientific programs, including outer space exploration and research under a special bureau which should be created for that purpose by an appropriate amendment to the bill.[17]

As has been developed in this section of the memorandum, there are varied points of view expressed on the part of scientists relative to the creation of a department of science and technology. Practically all of those who oppose the creation of such a department do so on the basis that by such action science functions of the Federal Government would be placed under a political appointee. About the only alternative suggestion that has come to the attention of the staff has been that all basic science functions, whether Government controlled or supported, should continue to be placed under the exclusive administrative jurisdiction and control of scientists, and the status quo maintained, except for increased funds.

There have been numerous conferences of scientists held in recent months out of which, as far as the staff has been able to determine, no specific conclusions have been reached or constructive recommendations made regarding the essential need for a complete realinement of the science functions of the Government. At the latest of these meetings, the so-called Parliament of Science, held in Washington on March 15–17, 1958, at which more than 100 top scientists and educators were in attendance, the proposal to create a department of science was, according to newspaper reports, summarily dismissed from consideration. The only explanation of such action was that some of the scientists in attendance contended that the Cabinet officer who would head such a department would be politically appointed, and, since there was no concerted agreement on what reorganization action should be taken, no constructive program was formulated for presentation to the Congress.

Under these circumstances, it would appear that the initiative and responsibility for coordinating Federal science activities will rest upon the Congress itself. While, under the normal procedure, qualified

[17] See proposed amendment No. 8, p. 57, and pp. 11–12.

experts are called in to advise the committees of the Congress regarding such legislative proposals, there appears to be such a fixation in the minds of scientists that politics would contaminate science in general and especially their particular field of science, there does not appear to be much hope of obtaining objective, unbiased, and constructive recommendations from most of the scientists who normally would be called upon to assist the Congress in drafting a program for legislative action.

There are exceptions to this general rule, however, as has been set forth in this memorandum. In answer to a question as to what the scientists are doing about correcting the view expressed by many scientists, that neither the Congress nor the general public knows anything whatever about science or scientific progress, Dr. Edward Teller, of the California Institute of Technology, in a special TV program on the role of the scientist in America's future, broadcast over the CBS Network on March 16, 1958, stated:

> It is considered, and wrongly considered, that this is too difficult and that the man in the street will never understand. It is a mistake. The man in the street can understand. Science is becoming familiar and more beautiful and we are missing a lot. And if you do not go in detail into the understanding of science then you will not be able to reach the reasonable decisions. *And the scientist is falling down.* Because he, in turn, instead of trying to explain how interesting and how beautiful science is, tells the people "these are the wonderful things that you may get out of science, these are the dangerous things that may come from science. You better listen to us." This is not the way. The way is, to try to show how simple really and how beautiful science is and can be. I am afraid there are lots of signs we are not doing the right things. *Our scientists are behaving like a bunch of highbrows who have been called highbrows and have gone in a corner and who now talk to each other in polysyllables which they themselves hardly ever understand.* They do not fulfill the really important functions, to bring the whole public with them into this beautiful and most imaginative realm of science. * * *

Also, in a book in which it was proposed to elevate the Atomic Energy Commission to a departmental structure, published in 1955 and entitled "Atomic Energy, A Constructive Proposal," David Shea Teeple wrote at length regarding the issues involved in connection with so-called political control over atomic energy, stating that—

> It is difficult to be restrained in discussing the importance of political responsibility when the trend among certain elements of our society is to place a connotation on the word "political" which implies that it is evil. * * *
>
> In a political system where public policy is established as a result of free elections, it is necessary that the electorate maintain control in those areas where the security, health, and general welfare of the people are concerned. This control must not be abrogated by an entrenched bureaucracy or delegated to individuals who are not responsible to the people. * * *

> The only mechanism which we have to control government is a system of free elections. To say that any function is so important that it must not be allowed to become political is to deny the basic premises upon which this Republic was founded.
>
> If the people and their elected representatives are not capable of making the decisions which affect their destiny, to whom shall those decisions be entrusted?
>
> Any time a vital area of the public business is removed from the ultimate control of the electorate, it is necessary for those who believe that the United States is worth preserving to reassert the principle of political control and restore to the people the people's business. * * *
>
> To take an agency of this importance and relegate it to a position in our political structure where it ranks below that of the Post Office is absurd.

AREAS OF CONTROVERSY RE PROPOSED TRANSFER OF THE NATIONAL SCIENCE FOUNDATION TO THE DEPARTMENT OF SCIENCE AND TECHNOLOGY

The National Science Foundation Act of 1950, which established the NSF, requires that the Foundation shall promote the progress of science; advance the national health, prosperity, and welfare; and secure the national defense. Its general purpose was defined as being (1) to develop and encourage a national policy for the promotion of basic research and education in the sciences; and (2) to initiate and support basic science research in the mathematical, physical, medical, biological, engineering, and other sciences by making contracts or other arrangements for the conduct of such basic scientific research and to appraise the impact of research upon industrial development and upon the general welfare.

Other declarations as to objectives of the act included directives to support scientific research activities for the national defense; award scholarships and graduate fellowships in specified sciences; foster the interchange of scientific information; evaluate scientific research programs undertaken by agencies of the Government, and correlate the Foundation's scientific research programs with those undertaken by individuals and by public and private research groups; establish special commissions as required; and to maintain a register of scientific and technical personnel, and in other ways provide a central clearinghouse for information covering all scientific and technical personnel in the United States.

The act further provided for the creation of a National Science Board consisting of 24 members who are "eminent in the fields of the basic sciences, medical science, engineering, agriculture, education, and public affairs." Members of the Board are appointed by the President with the advice and consent of the Senate, as is a Director, who is designated to be the chief executive officer of the Foundation and to serve as an ex-officio member of the Board.[18]

The 1950 act was approved by President Truman, who had previously vetoed a somewhat similar bill, on August 6, 1947. The basic objections the President expressed at the time of the passage of the act in

[18] Appendix A, p. 72, include brief summaries of NSF activities.

1947 were set forth in his veto message, pertinent extracts of which follow: [19]

> * * * This bill contains provisions which represent such a marked departure from sound principles for the administration of public affairs that I cannot give it my approval. It would, in effect, vest the determination of vital national policies, the expenditure of large public funds, and the administration of important governmental functions in a group of individuals who would be essentially private citizens. The proposed National Science Foundation would be divorced from control by the people to an extent that implies a distinct lack of faith in democratic processes. * * *
>
> * * * The Constitution places upon the President the responsibility for seeing that the laws are faithfully executed. In the administration of this law, however, he would be deprived of effective means for discharging his constitutional responsibilities.
>
> Full governmental authority and responsibility would be placed in 24 part-time officers whom the President could not effectively hold responsible for proper administration. * * *
>
> * * * Adherence to the principal that responsibility for the administration of the law should be vested in full-time officers who can be held accountable will not prevent the Government from utilizing with great advantage the services of eminent scientists who are available only for part-time duty. We have ample evidence of the patriotic and unselfish contributions which such citizens can make to the success of governmental programs. * * *
>
> * * * I believe that this bill raises basic issues of public policy. There would be no means for insuring responsible administration of the law. If the principles of this bill were extended throughout the Government, the result would be utter chaos. There is no justification in this case for not using sound principles for normal governmental operations. I cannot agree that our traditional democratic form of government is incapable of properly administering a program for encouraging scientific research and education. * * *

It will be noted that the basic objections upon which the Presidential veto was premised, except as to a matter of degree, were incorporated in the National Science Foundation Act of 1950. Specifically, the act as finally approved contained provisions which were (1) a marked departure from sound principles for the administration of public affairs, as defined by the President; (2) the President is, to a marked degree, deprived of effective means of discharging his constitutional responsibilities, since governmental authority and responsibility are to a great extent placed under the control of 24 part-time officers whom the President cannot effectively hold responsible for proper administration; and (3) the structure of the National Science Foundation does not insure responsible administration of the law.

It is the belief of the staff that so long as there is such a wide diffusion of supervision and administrative control over the activities

[19] Congressional Record, pp. 10567-10569, November 17, 1947.

of the National Science Foundation, and it has no operating functions, it will be impossible for that agency, as presently constituted, to properly advance the necessary programs for the development of basic sciences. It is difficult to conceive that any group of 24 scientists or specialists in related fields, each admittedly partial to his own specialized field of activity, can effectively appraise and approve a balanced basic science program which can be formulated and properly administered by the Director.

The National Science Foundation contracts for the carrying out of programs relating to the basic sciences. Of necessity, these programs are largely centralized in universities and technological institutions under the supervision of scientists who are considered to be qualified in the various fields of science for which such contracts are allocated—outside the actual administrative control of the Director and the President.

It is the conclusion of the staff that merely to increase the funds of the NSF to enable it to continue its present programs on an expanded basis, as proposed by the President and by numerous bills now pending in the Congress, would be no solution to the problem with which the Congress is confronted. If the program has not succeeded, as contemplated by the Congress—and it is believed that this will be developed at hearings—it should demonstrate conclusively that by merely allocating more funds in the wrong direction would evade the basic issues involved, and would constitute the expenditure of large sums of money without any reasonable expectation of improving the present status of the Federal civilian science program. When hearings are held, undoubtedly it will be repeatedly emphasized that the National Science Foundation is not an operating agency. In the view of the staff it should be an operating agency, or, preferably, under the supervision and direction of an operating department, if the objectives for which it was created are to be attained. On the other hand, the bill would not in any way affect the present research activities or programs of the National Science Foundation, and the Secretary of the Department of Science and Technology might find it desirable to have it continue to function as at present, under his direction and supervision. This administrative procedure would also apply to the program of the Atomic Energy Commission, which carries out its functions through contracts, and operates no laboratories or pilot programs.

AREAS OF CONTROVERSY RE PROPOSED TRANSFERS FROM THE DEPARTMENT OF COMMERCE

The staff attempted to secure the cooperation of officials of the Department of Commerce in determining which components of that Department might properly be placed in a new Department of Science and Technology, on the premise that the Congress might approve such legislation and, if enacted, the departmental structure should be perfected in every way possible. No such cooperation was forthcoming. The staff was convinced that the reason for this failure of cooperation was due to the fact that the Secretary of Commerce was opposed to the transfer of any of the functions of the Department of Commerce to a new department, not because the Department of Commerce is better able to coordinate the basic civilian science

program, but because such transfers would remove from the Department of Commerce some of its important components.

This is a matter of policy which will of necessity have to be determined by the Congress. In connection with such transfers, consideration should be given to whether the components proposed to be transferred properly belong in the new Department, or whether other functions or operating units now performed or vested in the Department of Commerce, such as the Weather Bureau and the Coast and Geodetic Survey and certain other activities might be better administered as science functions rather than industrial or commercial operations.

One of the most important provisions of the pending bill relates to the establishment of a centralized scientific information center. Many plans and suggestions have been proposed with reference to the manner in which this objective should be accomplished. A number of conferences have been held within the past few months, and well-developed programs have been presented for consideration and recommendations of all groups interested in correcting the existing deficiencies in this field. These include (1) a draft program for a National Technical Information Center, released by the Stanford Research Institute; (2) a plan proposed by Western Reserve University for the creation of a national center for the coordination of scientific and technological information, which was attended by representatives of more than 68 professional associations, educational institutions, foundations, and individual concerns; (3) a conference to reassess American strategy in the age of missiles, Soviet economic warfare, and massive propaganda, conducted by the National Military-Industrial Conference in Chicago; and (4) a conference of major scientific information services at Philadelphia.[20]

The staff submitted copies of the draft proposal of S. 3126 for consideration at each of these conferences, with a request that committees be formed to select appropriate spokesmen to present their views when hearings are scheduled so that the Congress may fully understand the problems involved and be in a position to consider the recommendations of these groups.[21]

Dr. James H. Shera, dean of Western Reserve University, in a letter to the committee, points up the existing deficiencies in the operations of governmental agencies in the field of documentation research, and the urgent need for coordination of any program that may be established by the Congress with existing private facilities qualified in designated fields of science, as follows:

> * * * We are sure that you, as we, are aware of basic limitations likely to be encountered in putting into effective operation the plans that have been formulated in the proposed bill. These limitations are, in general, human limitations and involve a careful and informed appraisal of the various forces in this country that must be balanced in order to achieve an effective program. We will comment in particular in this letter on one of the phases of the bill, namely, the provision for a Bureau of Technical Services—which is of direct concern to us in connection with activities here at Western Reserve University in conjunction with the Council

[20] See proposed amendments Nos. 7 and 13, pp. 57, 58.
[21] See pp. 35-37 for further details relative to the problems involved in connection with the development of this program.

on Documentation Research. These activities are directed to problems for improving the accessibility to open literature of the world.

In order to assure the necessary cooperation with existing information processing activities, as they are performed by the various scientific and professional societies of this country, we wish to urge that this Bureau be under the active guidance of an advisory council which will be in a position to represent the interests of the various professional societies so that they would not be compelled to seek other means of expressing their viewpoint to assure a balanced national program. As you know, in the area of processing scientific information, the professional societies have been making heroic efforts to control, to translate, to abstract, to index, to store, to retrieve, and to disseminate information essential to the development of scientific and technical progress of our country. The programs of some of the stronger scientific societies are based on the cooperation of the scientists of this country and any program which does not take into account these activities will most surely be inefficient if indeed not doomed to failure before it starts. There have been conspicuous examples of unsuccessful programs already in Government. We can point most strikingly to four:

A. The program of the Armed Services Technical Information Agency which since its inception has floundered through a number of years of false starts, errors in judgment, inadequate accomplishment, and poor management.

B. The Office of Technical Services which has steadfastly backed poor bets in the scientific documentation field until its influence and worth to the country has been utterly inadequate to the task.[22]

D. The Office of Scientific Information of the National Science Foundation which, through support of ineffective programs in information, has contributed to increasing confusion among the serious workers in this field.

We attribute these and other failures, not to the basic purposes as written into the functions of these organizations by Congress, but rather to weak and timid leadership that has prevented an aggressive accomplishment of essential programs. * * *

To further illustrate some of the problems that must be considered before final action is taken on any proposal to centralize the assembling, storage, indexing, and dissemination of scientific data, the following extracts are taken from a letter addressed to the committee by Mr. E. J. Crane, director and editor of the Chemical Abstracts Service, perhaps the leading privately operated translating and abstracting service in the science field:

* * * For the good of our Nation, considered from any point of view, this is a task which should be accomplished for all scientists and not just for scientists in the Government service. Scientific research is going forward under many circumstances in many places, much of it fundamental

[22] See pp. 6-9.

research, and it all fits into the picture of scientific progress and national strength. The scientists themselves need to participate in the recording and in the record searching for effective results.

Storing information is not enough. Translating is not enough. The dissemination of information from a center merely on the basis of what it thinks certain laboratories would want or in answer to questions is not enough because no center can do this adequately.

The most successful method thus far worked out in making scientific information truly available consists of the systematic publication of informative abstracts complete from the indexing point of view and then the publication of frequent indexes or keys (good ones) plus collective indexes to each organized set of abstracts. Such indexes must be scientifically prepared by highly trained scientists. They must make it possible for each research worker, who will grow in the midst of his literature search, to put his finger on every bit of new and useful scientific information whenever he wants it. Information can easily be buried in an information-service record unless there is great care.

Science is a broad subject. There are many branches of science and within each branch the scientists are almost always specialists on some subject-matter field. In chemistry, there are physical chemists, organic chemists, biochemists, and many other kinds. Within each of these branches of chemistry there are subbranches, with the chemists of them well informed only in their narrow fields. The subject is too big for anything else to be possible. These specialists must be on both ends of the scientific record for it to be effective. In other words they must help in the abstracting and, to some degree at least, they must participate in the searching for really good results. This is the way it is done in chemistry.

I have pointed out above subdivisions of science because in my opinion it would be totally unrealistic to try to build a general science information service which would operate as a whole both in the building and in the use. There is need for a service for chemistry restricted to chemistry, for a service to physics restricted to physics, for a service to biology restricted to biology, for a service to astronomy restricted to astronomy, etc. If these were all combined, for example, in one set of abstracts and in one big key to this information, the situation would be hopeless. The Russians have recognized this by the publication of a dozen or more abstract journals for various branches of science with overlapping. By overlapping, I mean that some abstracts are repeated in two or more of the abstract journals with the abstracts made from the point of view of each branch of science. This same matter is recognized in this country by the existence of a considerable number of abstract journals for different fields.

What is needed in my opinion is the strengthening of the backing of some of the efforts by scientific organizations and not a duplication of their work. Government money could

help them, but it could not buy the kind of services which the members of these organizations provide in the literature-handling work of the organizations.

I do not write from the office of Chemical Abstracts with any fear that our service may be surplanted by the governmental plans. I know that there is no such intention, nor do I think that this could happen. The chemists believe that they are the only ones who can do their record keeping adequately because no one else is actively in the midst of chemical research. They do not seek or need help.

Much is being said these days about mechanized scientific information storage and retrieval. The effort for this is commendable. It should be borne in mind, however, that this kind of effort has only been successful thus far for limited services operated by the users thereof. Our Government might very well participate in research on this problem, but it would be a mistake for it to do operational planning with the belief that solution of the problem is just around the corner. Mechanization is far from the complete answer now, and it is not likely to be the complete answer for a long time. The reasons behind this statement require considerable elaboration which I will be glad to supply if wanted.

The last paragraph of your letter contains the following sentence: "The committee will necessarily have to determine whether or not it is necessary to establish a central Federal depository or library for the assembling of foreign language material or the translation thereof, or whether the Government's interests would be served by maintaining only a controlling and retrieval system under which existing services, such as Chemical Abstracts, would be made available without in any way duplicating existing private facilities." In this connection may I point out that the Library of Congress is already effectively assembling foreign-language and other scientific material and that other libraries in Washington are doing the same with some specialization, as the library of the United States Department of Agriculture. I also mention that existing services such as that of Chemical Abstracts are already available and in wide use in Government laboratories. I wish I could do so, but I do not see, therefore cannot suggest, how these services could be made more effectively available by a governmental "controlling and retrieval system." I cannot picture such a system as possible and effective. I repeat that the strengthening of some of the existing services and the inauguration of abstracting and indexing services for the new fields which do not already have such services seems to me to be the economical and effective procedure.

Dr. Wallace R. Brode, science adviser to the Secretary of State, further outlined some of the problems relating to abstracting and retrieval of scientific data, which this proposed program attempts to correct, in testifying before a subcommittee of the House Committee on Government Operations, on January 21, 1958, as follows:

> With about half a million scientific articles published this year, it is just humanly impossible for a single intellect to

cope with this amount of information, which increases in size at more than 10 percent additional every year. As Dr. Berkner indicated, it is necessary to subdivide science into areas, which subdivisions are increasing in number, and it is necessary to provide to these areas adequate abstracting services to bring essential facts to the individual and an adequate indexing system to permit location and retrieval of the information or segments of specific interest.

Only in the field of chemistry, as maintained by the American Chemical Society's publication Chemical Abstracts, can we be considered to provide our scientists with a reasonably complete abstract and index service. The enormous size of this undertaking is indicated by the fact that last year's publication amounted to about 100,000 abstracts in 10,000 pages of close printing and the index alone to last year will amount to about 5,000 pages.

Some form of assistance is necessary to bring other sciences up to the chemical abstracts level and to accelerate the abstracting and indexing services of all areas of science. Due to limited trained personnel and printing problems, there are time lags at nearly every step between the public release of information and its ultimate record in the index of the abstract compilation, at which point it becomes available to the scientist without such impediments as need for separate scrutiny of the vast literature, attendance at all technical meetings or other activity which may by chance lead him to the information. Unfortunately, our indexing process requires time properly to code, name, and cross reference the hundreds of thousands of compounds and effects, so that we do not expect the index to the 1957 Chemical Abstracts to be published until the winter of 1959. Looking backward, this index, which will be available in December 1959, covers the abstracts of the year 1957, which abstracts in turn cover papers published for the most part in 1955 and 1956 and the early portion of 1957. These papers in turn cover work which was completed and released for publication in 1954–56.

If we are to obtain and hold a lead in science, it is obvious that we must reduce this time lag and at the same time improve and expand our collection of scientific material by exchange and publication as well as abstract coverage. Research and assistance are required to improve both publication and indexing procedures.

Dr. Leon Jacolev, technical director of the Associated Technical Services, Inc., maintains in a letter to the chairman of the committee that—

> There exist facilities at the present time, for indexing and classification of translations in the fields of science and technology prepared from all languages, including Russian. The agency referred to is the Joint Crerar Library, 86 East Randolph Street, Chicago 1, Ill. This library received many thousands of dollars from the National Science Foundation for the specific purpose of acting as a clearing house and reporting agency for translations available throughout the

world. The Crerar Library publishes the Translation Monthly, wherein all of the accessions and other translations prepared by private agencies, governmental institutions, foreign scientific bodies, etc., are reported. This monthly publication breaks down the translations by subjects and contains an author index. Furthermore, the same library also publishes a cumulative subject and author index, which makes the information readily accessible to any interested scientists. All of the translations are available at nominal cost to anyone either from Crerar or the institution that prepared the translation. If, as you say, Federal agencies are now duplicating translations, it is entirely their own fault, and is probably due to some red tape entanglements and possibly secrecy classifications. It is deplorable that such a situation exists, when a Federal agency, to wit, the National Science Foundation, is pouring thousands of dollars into a project whose very function it is to avoid such duplications. Rather than create another superagency, why not make use of what is already available?

It would also appear that the committee is intent on placing the Government into a business that would drive out private companies engaged in translations, abstracting, dissemination of foreign information, publishing, etc., out of business. Once Government funds are poured into the creation of Federal institutions, the private business performing similar functions must obviously wither. It is difficult to understand why in trying to combat the Communist threat, we must adopt their methods when we could accomplish as much, and more, by using our system of free enterprise. * * *

It would appear to me that the best way to give our scientists the needed foreign, especially Russian, technical information, is to make full use of the available facilities of the Library of Congress, National Science Foundation with its many contractors, Atomic Energy Commission, private organizations, documentation sources throughout the English-speaking world, etc. Translation of scientific information can best be done by private organizations who have the experience and facilities built up over a period of many years. For the Government to enter on a large scale into the translation business, would wipe out the private industry in this area, without any real advantage to the consuming scientist.

What Dr. Jacolev fails to recognize is the fact that the bill as introduced adequately provides for the full integration and utilization not only of existing Federal services in this area, but specifically requires cooperation with all private sources which are generating information in the science and technological fields, and, to avoid duplication of services. The intent is not necessarily to create new facilities, but to coordinate, to the fullest extent possible, those which exist into a central area where they would be available to agencies of the Federal Government, which is to be the ultimate beneficiary of the act's provisions, as well as to scientists generally. As indicated in the letter from Mr. E. J. Crane, director and editor of Chemical Abstracts

Service, previously quoted,[23] those agencies engaged in this field are fully conversant with these objectives of the bill.

There are provisions in the bill which would specifically prohibit the proposed Department of Science and Technology from competing with existing nongovernmental facilities. On the other hand, there are provisions which specifically require that the Bureau of Technical Services may supplement and support services provided by nongovernmental sources in the field of collecting, translating, or disseminating scientific information, in the development of mechanical aids, and to undertake, through the facilities available to the Secretary, including educational and research institutions and private laboratories, the establishment of such additional services as may be required to further scientific, engineering, and technological research, and to aid in the development of inventions, discoveries, products, processes, and techniques.

In hearings recently held by the Subcommittee on Information of the House Committee on Government Operations,[24] Dr. Loyd V. Berkner, president of Associated Universities, Inc., and of the International Council of Scientific Unions; Dr. Wallace R. Brode, science adviser to the Secretary of State and president of the American Association for the Advancement of Science; Dr. Hiden T. Cox, executive director of the American Institute of Biological Sciences; Dr. Donald J. Hughes, senior physicist, Brookhaven National Laboratory; and Dr. Warren Weaver, vice president for the natural and medical sciences for the Rockefeller Foundations and a member of the Board of Directors of the National Science Foundation, were in unanimous agreement as to the urgency and the necessity for the establishment of a vastly expanded national program to facilitate the flow of scientific and technological information. Their position was stated clearly by Dr. Hughes in the following comment:

> Because of the intimate relationship of the many branches of basic research to each other, it is vital that scientists have ready access to the great range of technical literature with a minimum delay. Because of the importance of research to later military developments, the flow of information, which is vital to the development of basic science, has a direct bearing on the actual survival of our Nation. Science is becoming an ever more important aspect of our life and it is certain that this trend will not only continue but accelerate.

An area which will require extensive study by committees considering the problems of collecting, translating, and abstracting scientific data involves the better utilization of qualified translators in the United States. At the present time the policy followed by Federal agencies engaged in this type of activity is to utilize existing facilities through the extensive use of contracts, primarily with universities. The difficulty has been, according to information submitted to the staff, that contracts awarded to such universities, or private translating services, contain restrictive provisions as to how the work should be done and governs the amount of compensation to be paid to translators.

There is a difference of opinion as to the availability of qualified translators, who must be not only linguists but must also have tech-

[23] See p. 27.
[24] January 20, 21, and 22, 1958, pt. 15.

nical knowledge of the subject with which articles or manuscripts deal. For instance, certain agencies of the Government contend that such qualified translators are simply not available. On the other hand, persons who make a profession of doing translating work contend that there are more than enough qualified translators to effectively establish a program which would be adequate to meet the needs of the Government and scientists generally. It has been pointed out that under the contract authorizations, however, the prevailing rate paid is reported to be less than $4 for each 1,000 words, and that qualified translators find that this compensation is far below what they can earn in other occupations. As a result, it is reported that many able and fully qualified translators in this country are presently engaged in other occupations and their talents with respect to the performance of the much-needed services required in this area are wasted. The committee, in considering this phase of the bill, should develop testimony regarding the Government's policies, as well as those of industry, in the present utilization of qualified translators who have the necessary technical knowledge required to develop a uniform program in this important field.

As a result of present policies, the staff has been informed that much of the translation work is done by foreign translators abroad at lower rates than the prevailing rates in this country, which has also tended to further discourage translators in the United States, and has created a serious employment problem for many able and qualified translators who would prefer to continue in this occupation.

Other aspects of the program relating to the essential need for improving the existing facilities for the assembly and distribution of foreign scientific, technical, and engineering information, dealing with the proposed improvement of the legislative process, are included in the section which follows.

Committees on Science and Technology

As originally drafted, the bill contained another title (title II, Committee Print No. 2, January 17, 1958) which proposed the creation of standing Committees on Science and Technology in the Senate and House of Representatives, to have legislative jurisdiction over science and technology generally, the operations of the Department of Science and Technology, and the general oversight jurisdiction now vested in the Joint Committee on Atomic Energy.

The Joint Committee on Atomic Energy would have been abolished and its functions and members reassigned, with retention of their present seniority, to the permanent standing committees in the respective Houses of the Congress.

The Senate committee, as proposed to be established by the provisions of the bill as introduced, would consist of only the present 9 Senators serving on the Joint Committee on Atomic Energy, while the House committee would consist of a total membership of 25, of whom the present 9 House members of the Joint Committee on Atomic Energy would be its ranking members, with 16 others to be selected from among other Members of the House as appointments are made to other committees under the normal seniority rule.

Both committees would be considered of major importance, the proposal being that the Senate committee would be enlarged to 15 mem-

bers, the additional Senators to be assigned as are other committee assignments in the Senate. Inasmuch as these questions involve high policy determinations, and detailed changes in the rules of the Senate respecting numerical assignments to committees by both the majority and the minority, no attempt was made to draft the necessary language changes required in the original draft, until appropriate consideration could be given to the proposal by the committee and the Senate and House leaderships.[25] Since the select committee, established by Senate Resolution 256 is composed of the chairman and ranking minority member of six standing committees of the Senate which have certain legislative jurisdiction over science legislation, that committee should be qualified to make recommendations for appropriate action in the Senate.

The title was omitted from S. 3126, as introduced, for the following reasons: (1) It was felt that consideration should first be given to whether or not a Department of Science and Technology is to be created; in the event that a decision is made in favor of such a Department, the establishment of such committees would then be essential; (2) leadership determination should be ascertained in both Houses before definite proposals should be considered (*a*) to effect the necessary rules changes governing majority and minority assignments relative to the number of committees to which a Member may be assigned, and (*b*) to resolve questions concerning seniority and the abolition of the Joint Committee on Atomic Energy; and (3) a determination should be made as to whether such committees should be created to insure coordination of civilian science functions at the legislative level, regardless of whether a new department is established.

Objective

In the view of the staff, science, research, and technology have attained such an important status in the Government that standing Committees on Science and Technology should be created in the Senate and House of Representatives, regardless of whether a Department of Science and Technology is established. In the view of a number of scientists and authorities consulted regarding this proposal, there is an urgent need for the coordination of science and technological oversight jurisdiction at the legislative level, and, in the opinion of the staff, the creation of such standing committees would provide the most effective solution to this problem.

At the present time only the Atomic Energy Commission, the Department of Agriculture, and the research and development programs of the military have special committees of the Congress, which evaluate their authorizations, programs, and needs. These are the Joint Committee on Atomic Energy, the Committees on Agriculture, and the Armed Services Committees. From general observation of committee activities, there are indications that even these operations are authorized and carried on without proper relationship to or evaluation of other civilian science programs, such as the programs and activities of the National Advisory Committee for Aeronautics, the National Bureau of Standards, the Office of Technical Services, and the Patent Office.

Some of the program authorizations of the NSF are approved by the Committee on Interstate and Foreign Commerce, others are acted upon by the Committee on Labor and Public Welfare, while still other

[25] The bill as proposed to be revised, p. 63, provides for the appointment of 15 Senators, the present Senate Members retaining their seniority.

projects under its control and jurisdiction, or to which it allocates funds, originate through other committees. There are instances where certain aspects of some of these agencies are acted upon by different committees of Congress, with no central coordination or evaluation as to the relationship one such program may have to another. An outstanding example of this is the manner in which the operations of the science functions of the Department of Commerce are considered in the Congress. The Secretary of Commerce is concerned primarily with regard to what he considers to be his basic functions in behalf of American industry and commerce, and transportation problems. The science functions are treated as adjuncts to what are considered to be major operations of the Department. Consequently the National Bureau of Standards, the Office of Technical Services and the Patent Office programs and needs are likely to be given inferior positions in the manner of presentation to the various committees which must pass on their programs and appropriation authorizations. These programs are considered primarily by the Committees on Interstate and Foreign Commerce, Appropriations (since it was created, the Office of Technical Services has been severely handicapped for lack of funds, by crippling amendments to appropriation bills as far back as the 79th Cong.), and the Judiciary.

At a meeting of officials representing Federal agencies engaged in assembling, translating, abstracting, and disseminating Russian scientific information for the Federal Government, held last October, it was agreed that these agencies, which included the Central Intelligence Agency, the National Science Foundation, the Atomic Energy Commission, the Department of Defense, the National Institutes of Health, and others, would turn over to the Office of Technical Services, as a central coordinating agency, all such material for reproduction and distribution to scientists who are engaged in the respective areas of science to which the documents have reference, including scientists attached to the International Geophysical Year program. In order to initiate and organize this proposed program, a request for a supplemental appropriation of $300,000 was submitted to the Congress, with approval of the Bureau of the Budget. Additional funds are also requested to carry out the program in fiscal year 1959, in the regular appropriation bill. This supplemental appropriation request of OTS was rejected by the House Committee on Appropriations. In its report (H. Rept. No. 373, 85th Cong.) the committee explained its action as follows:

> House Document 313 proposed a supplemental appropriation of $300,000 for the initiation of a program to make available to American science and industry translations of foreign documents in the fields of technology and applied science.
>
> The committee has not included this item in the accompanying bill. Funds for this purpose are also requested in the regular 1959 budget and the committee expects to consider this matter further during the hearings on that estimate. The department should give this proposal further study in the meantime, in view of the fact that other Federal and private agencies are already doing some work in this field.

The Senate Committee on Appropriations took the same view, and the funds will therefore not be available for this purpose, at the earliest, until the next fiscal year.

The delay in providing the preliminary funds for the initiation of this program, which cannot now be fully implemented until the annual appropriation bill providing funds for the Department of Commerce has been approved, will mean that the translation and distribution of available scientific material from Russian sources will not be distributed until late in 1958. According to information available to the staff, there are already some 20,000 abstracts and 5,000 translations now available for distribution through the various Federal agencies, which cannot be processed since the proposed program was geared to the circulation of such material on a current basis. No provision was made to cover such abstracts and translations which were not current. Therefore, this action, unless made retroactive at least to some extent in the annual appropriation bill during the intervening 6 months will be lost to the scientists interested in obtaining information emanating from Russian sources during the important period immediately following the launching of the Soviet satellites. This report includes information elsewhere [26] as to the time lag that already exists in this field.

At a regional conference on the outlook for science in America, conducted by the Massachusetts Institute of Technology, held on March 1, 1958, Dr. James R. Killian, Jr., special science assistant to the President, commented regarding the need for this program, and the problems involved, as follows:

> In addition to policies affecting basic research, intensive attention must be and is being given to improving the collection and disemination of scientific, technical, and engineering information.
>
> One of our most immediate tasks is to find mechanisms to make more generally known to the scientific community the availability of information already in hand. While we have problems of collection, we have greater problems in distribution. * * *
>
> It must be added that there is not enough coverage by the total national translating activity of the significant material being produced by the Soviet bloc. Some 40 Soviet scientific and technical journals are presently being translated: 20 by the Federal Government and 20 by commercial concerns. In addition, a large number of abstracts of the Soviet literature are being produced in selected technical fields. Translation coverage is particularly inadequate in the fields of biology, physics, geophysics, electronics, and the earth sciences.
>
> As efforts are being made to improve Government procedures and efforts in the collection and dissemination of technical information, we need at the same time to give attention to nongovernmental services. We need to find a way to increase the support of numerous United States scientific journals so as to expedite the publication of scientific papers. The situation is such that considerable delays attach to the publication of scientific papers. * * *

The delay in the initiation of this program points up the serious problems that are involved in connection with funds required for scientific activities through various subcommittees of the Committees

[26] See pp. 28 and 30.

on Appropriations. One such subcommittee may act upon science activities of the Department of Commerce, another has to do with the appropriated funds for the National Science Foundation or medical research, another for agricultural research, etc.

It is the judgment of the staff that this problem might be partially solved through a provision which would amend Senate Rule No. XVI to authorize the appointment of 3 members from the proposed Committee on Science and Technology as ex officio members of the Senate Committee on Appropriations, in lieu of the 3 members now so assigned from the Joint Committee on Atomic Energy. These members would be available to enable members of the appropriate subcommittees to have full information relative to the need for such funds, and to coordinate allocations of other funds appropriated for general science programs, certain phases of which are carried on by other Federal agencies provided with funds in other appropriation bills. Such a provision is included in the proposed revised bill.[27]

Furthermore, the workloads of legislative committees are centered primarily on what they consider to be major fields of governmental operations coming within their oversight jurisdiction. Because of the necessity for devoting the major portion of their time to consideration of these matters these committees have been unable to find adequate time to fully evaluate related problems having to do with science, research and technology, their relationship to operations in this area within other Federal agencies, or to develop adequate coordinated programs particularly those which deal with fundamental science.

In the view of the staff, the oversight jurisdiction of the Joint Committee on Atomic Energy should be assumed by permanent standing committees in the House and Senate, along with other basic science programs which have governmentwide application in some of their aspects, as was proposed in title II of the original draft of the Science and Technology Act of 1958, and under the provisions of the substitute bill.[28]

The operations of the Joint Committee on Atomic Energy are unnatural in a bicameral system such as the Congress of the United States. It operates on a unicameral basis, which prevents the development of full debates in the House and Senate, as was intended by the Constitution. Thus, if Members of the respective Houses are unable to agree on legislation pending before it, compromises are necessary in committee if the legislation is to be reported at all, and, since the facts are not given extended consideration or fully debated in each House, Members who are not members of the committee are compelled to accept what might well be ineffective or deficient legislation without having the details relative to points that may be at issue fully developed in the normal legislative process.

It is understandable why the Atomic Energy Commission should prefer to have its own committee, since that agency has a medium through which it can give members full details of its operations. However, this can still be accomplished, without impairment of procedure, either by appointing a Subcommittee on Atomic Energy composed of exactly the same members (9) who presently serve on the Joint Committee on Atomic Energy (as well as a special Subcommittee on Astronautical and Outer Space Development, and other major activities).

[27] See p. 64.
[28] See pp. 63–66.

Or, if the standing committees should determine that joint committees would be desirable so that Members of both Houses could participate in joint hearings, they could be created on the same operating basis as the Joint Committee on Atomic Energy, as service committees to the standing committees, as is now done in the case of the Joint Committee on Internal Revenue Taxation. The major change would be that the normal legislative process would be restored, and science programs would be approved by regular action of standing legislative committees functioning exactly on the same basis, in the same manner, and following the same procedures as other standing legislative committees. This would insure full debate in both Houses of Congress, and a full presentation of all the issues involved before the enactment of legislative proposals dealing with atomic energy.

Congressional history shows that the Joint Committee on Atomic Energy is the only such permanent joint committee with continuing legislative responsibility ever created. There are perhaps less than a dozen instances where joint committees have been established, and all of these have been set up on an ad hoc basis, and ceased to exist after they had completed their appointed task and reported to the Congress. In some instances these committees were authorized to report legislation, but in each case it was provided that they were not to be continuing bodies, and would cease to exist after fulfillment of their appointed task. The three most important of these committees included the following:

1. A joint committee was appointed in 1821 to consider conditions under which Missouri was to be admitted into the Union which had resulted in a deadlock between the two Houses of Congress. That joint committee proposed legislation which resulted in what is termed the "Third Missouri Compromise."

2. The 76th and preceding Congresses having failed to enact urgently needed reorganization legislation, a joint committee on reorganization was appointed to consider proposals that the President should be authorized to submit reorganization plans which would become law unless disapproved by the Congress, since standing committees had not been able to reach agreements on specific reorganization proposals. This joint committee ceased to exist after it completed its studies and recommendations, which resulted in the enactment of the Reorganization Act of 1939.

3. The Joint Select Committee on the Organization of Congress (LaFollette-Monroney committee) was created in 1946 because repeated efforts to effect necessary reorganizations of the Congress had failed, and it was recognized that only through such joint action could the necessary reforms be effected. That joint committee also ceased to function after the enactment of the legislation it reported to the 79th Congress—the Legislative Reorganization Act of 1946.

Another important consideration involved in connection with the creation of standing committees on science and technology is the necessity for providing competent staff assistance to the House and Senate in the development of science programs and policies.

The Joint Committee on Atomic Energy has a staff which is presently numerically equal to or in excess of staffs assigned to standing committees. But that staff directs its attention solely to atomic energy problems. Other committees dealing with various aspects of science and technology, such as the Committees on Armed Services,

Interstate and Foreign Commerce and Labor and Public Welfare have a limited number of staff members with scientific and technical qualifications in those fields in which these committees require specialists or qualified technical advisers.

It would appear to be essential, however, that the Congress have available constant advice and expert staff assistance in all areas of scientific research and development, including those related to the development of outer space programs. Should committees on science and technology be created, it would follow that staff members qualified in all areas of civilian science, engineering and technology would be made available to members of these and other committees, or to joint or subcommittees appointed to study the specific areas coming within their jurisdictional oversight.

The committee has received comments from persons who are thoroughly familiar with the operations of the Federal science programs, and with the deficiencies in the executive and legislative processes. One such qualified expert, Mr. John Lear, science editor of the Saturday Review, recently wrote the committee as follows:

> * * * I think it would be most unfortunate if S. 3126 were permitted to go through without the original title II (committee print No. 2). No amount of reorganization on the executive side will do much good, unless the Congress is prepared with its own systematic method of meeting the scientific challenge.

Mr. John C. Honey, whose comments on the proposed legislation are set forth elsewhere in this memorandum,[29] while pointing out that he was not familiar with the different operating functions that would be performed by standing committees in relation to a joint committee, took the view that "I hardly need say that it makes great good sense to establish new standing congressional committees on science and technology."

The need for some reorganization of the legislative process in the fields of science and technology was pointed up by Dr. Vannevar Bush as far back as 1945.[30]

Although some officials of the Government who have been consulted regarding the proposals to create standing committees in the Congress, oppose the creation of a department of science and technology, they were all unanimous (the AEC excepted) in indicating an interest in the improvement of the legislative process. They felt that the establishment of standing committees would provide them with a means for making their needs known to the members of such committees and the Congress, and would afford them access to staff members who would be qualified in the various fields of science to evaluate existing programs, to develop and recommend perfecting legislation, and to prepare the necessary supporting data, whenever required.

As pointed out in the explanation of the provisions of title I,[31] relating to components that should be included in the proposed new Department, only those agencies engaged in science activities of general application have been incorporated. There are undoubtedly other functions which the Congress may determine should be brought into the general science program assigned to the new Department, or pos-

[29] See pp. 17, 75 and 97.
[30] See pp. 86, 88-90 of pt. II.
[31] P. II.

sibly it might be determined that those components proposed to be assigned should, after further consideration, retain their present status after all pertinent facts have been developed. Should standing committees on science and technology be created, with continuing jurisdiction over Federal science activities, competent staffs of such committees, trained in science, engineering, and technological fields, would be in a far better position to evaluate the extent to which various agencies of the Government should participate in basic science activities, such as a program for the control of outer space, and to submit recommendations and proper supporting data than is the staff of this committee. These committees could then determine what further legislative action should be proposed to perfect the organization and operations of the Department of Science and Technology, thus insuring a continuing and effective program for the formulation of a coordinated program for the development of fundamental science and, specifically, an adequate program for outer space development.

Dr. William Pickering, Director, Jet Propulsion Laboratory, California Institute of Technology, in response to questions propounded to him on a recent TV program,[32] relative to the Federal organizational structure necessary to adequately develop a program for outer space control, replied, in part, as follows:

> * * * I feel that the scientific and technological developments should somehow be under more explicit control of the scientists themselves * * * as far as the military are concerned, a military man must always be conservative. He must have faith in his weapon; therefore, he must like the things he has, he must be somewhat concerned about the new. * * * I think, myself that such a space program should be under civilian direction. I feel that this is a civilian exploration of space. * * * My personal feeling is I would set up a new agency. It is a big job. It is a job which is going to go ahead for many decades. * * * I would set up a completely separate agency. I think this is a new type of problem, which is not very closely allied to the sorts of things which the NACA is now contributing to the Nation. I believe that the NACA, of course, has a very definite part to contribute, not only in aeronautics but also in astronautics. * * *

In regard to the proposal that the Atomic Energy Commission might better perform this function, Dr. Pickering stated:

> If one thinks first of how to use a nuclear powered rocket, then of course what one has is basically, shall we say, an infinite source of energy in a nuclear reactor. Now, to push a rocket along with that, you have to convert this energy into momentum in some fashion, and so one dreams up schemes, then, by which this nuclear reactor heats a working fluid of some kind, and imparts momentum to it. Such a scheme, as a matter of fact, is a rather complicated scheme, and I believe that it will be quite a long time before nuclear devices of this sort, considering all the radiation hazards, and so forth, associated with it—before nuclear devices of that type are really competitive with the chemical systems.

[32] Face the Nation, CBS Network, February 16, 1958.

Now, I will say, on the other hand, that if one thinks about the problem of navigation in space, it no longer becomes necessary to have a thrust which is very large. One can get around in space very effectively. And this, I think, might be a place where nuclear devices would be useful.

Title II. National Institutes of Scientific Research

Section 201 of this title contains congressional findings that a greatly expanded program of basic scientific research is needed in the United States, and that the national interest requires that the United States Government afford creative scientists the environment and advanced facilities most conducive to the conduct of such research, either by the establishment of research centers, or by making available the funds, incentive, and encouragement necessary to enable the establishment or support of such centers through nonprofit organizations outside the Federal Government. It is declared that the purpose of the title is to encourage the establishment and support of scientific research centers for the conduct of basic and applied research by making available adequate financial support necessary to attract and utilize, to the fullest extent possible, the most talented, qualified and creative scientists in the Nation.

Section 202 authorizes the Secretary to establish or support one or more scientific research centers in the physical and biological sciences, mathematics, and engineering, and in the social sciences. Such research centers would be devoted primarily to basic research and would be operated largely by private, nongovernmental institutions, on a nonprofit basis, with financial support from the Federal Government. Authority is also given to the Secretary to conduct such research activities directly, under certain circumstances.

Under section 203, the Secretary would be authorized to establish and operate certain types of applied scientific research centers, either directly or on a contract basis through nongovernmental organizations, whenever the national interest required and sufficient economic incentive does not exist for the undertaking of such research by nongovernmental organizations without governmental support.

Section 204 provides that no scientific research center or institute established or supported pursuant to this title shall be of a profit-making character, and provisions have been included to avoid duplication of existing research facilities.

Sections 205, 206, and 207 require that the administration of each research center established and operated by the Department shall be under the direction of a Director and two Associate Directors, appointed by the Secretary, without regard to civil service laws; that reports shall be submitted annually to the Secretary by the Directors of the Institutes as to the research programs undertaken and planned; and that the Secretary shall report annually to the Congress relative to the nature of the program undertaken, the current costs and the estimated cost of each succeeding year.

Objective

There appears to be general agreement that a greatly expanded program of basic scientific research is urgently needed in the United States and that such work must be carried on by outstanding creative scientists. Staff studies reveal, however, that scientists of this type

are employed, for the most part by universities and, due to increasing enrollments and the pressure of faculty committee, or other administrative duties, are precluded from full use of their creative talents. Many scientists are employed in industry at salaries and benefits far in excess of those offered by universities or by the Federal Government, but they are engaged primarily in applied rather than basic research. These studies also reveal that, in order to attract scientists of the type needed for this important work, it will be necessary for the Federal Government to provide the proper environment and facilities and adequate financial support.

Furthermore, there are certain areas of scientific research which require so large an investment that only the Federal Government can afford to undertake them. It is the purpose of this title to meet these needs by providing for the establishment and support of scientific research centers, either by making available the funds necessary to enable the establishment of basic research centers by private, nonprofit organizations outside the Federal Government or by the Government itself, and to make available adequate financial support to attract the most talented and qualified scientists in the Nation.

In a speech made more than a year ago, Mr. Earl Bunting, former president of the National Association of Manufacturers, pointed out the great need for increased emphasis on basic studies in physical sciences, stating that—

> Unfortunately, there is not the same general recognition of the need for substantial sums for the extensive and intensive concentration in the field of "pure" research—the realm of basic studies. There is not general recognition of the fact that applied research cannot go beyond the store of fundamental knowledge available for application to specific products or processes.
>
> Many years of patient observation, experiment, testing and analysis by minds specially trained in painstaking investigation into the unknown, have developed the new knowledge—often impossible to identify in terms of commercial value—which has permitted every subsequent technological advance. * * *
>
> If the great need for new knowledge—coming from basic research—is to be met, it would seem that some new type of operation is needed. One form which is developed with the closest possible relationship with universities is visualized. Out of such association could come certain outstanding specialists in the academic world, whose skills and knowledge might be utilized as program directors or as researchers upon specific problems. In no sense should proposed undertaking be thought of or become competitive to the universities of the country.
>
> Such an operation as has been discussed might involve completely separate physical facilities for research work in basic fields in centers staffed (either permanently or upon a project basis) by "our most gifted and resourceful scientific philosophers established in well-staffed, well-equipped laboratories, isolated from the impositions of industrial managers, removed * * * from the restrictions of university

> administration; fully protected against the depredations, confusions, and conflicts of government control."
>
> The Basic Research Institutes of the University of Chicago, the Institute for Advanced Studies at Princeton, and the Carnegie Institute of Washington are cited as examples of such concentrated and detached operations. * * *

Dr. Albert E. Sobel, a prominent scientist and lecturer and the author of many scientific publications, recently submitted to the committee a plan for stimulating basic science research. Dr. Sobel summed up his program in the following manner:

> In the modern sense, we have neither positions nor institutions whose primary task is to develop new knowledge. Thus we have no professional science. We have a fairly good training program for developing scientists but, after they have been trained, we have no positions for them as creative scientists. They are either employed by industry to develop commercial products or in medical institutions to find a cure for some disease, or they may obtain a teaching position at some university. In all these places creative research occupies a secondary role. The net return of fundamental knowledge compared to the talent invested is insignificant.

Further support for the establishment of the program provided for in this title is found in the recent testimony of Dr. L. V. Berkner, president of Associated Universities, Inc., before the Executive and Legislative Reorganization Subcommittee of the House Committee on Government Operations, on January 28, 1958, as follows:

> * * * Large research tools are often expensive and no nation can afford to build or operate very many of them. Limitation on funds and the required efficiency of operation requires that a single such instrument serve the needs of scientists from many universities. Thus, the national laboratory or institute is designed to provide access to such great scientific tools and means by the scientists of university faculties throughout the country. * * *
>
> The need for the facilities that only the national institute or the national laboratory can provide is apparent in many fields. At the moment, for example, research in meteorology is very restricted by the power and quality of the tools at hand. Meteorology is not limited by lack of adequate clues to nature, for they are prolific and exciting. But to explore these clues men require very large and unique tools, and the opportunity for rather massive group attack on the secrets of the atmosphere. * * * Meteorology is but one example of a scientific area where research has become rather sterile and disjointed for the crying want of tools and means to break the bonds of ignorance on a planetary scale. A properly equipped national institute or laboratory functioning in close collaboration with the universities could do this job.
>
> Likewise, problems involving the need for institutes or national laboratories are evident in the field of oceanography and of other areas of science where the scale of the problems

is far beyond the capacity of individuals of university faculties working by themselves with their limited resources to undertake. A start has been made by the National Science Foundation in establishing the National Radio Astronomy Observatory at Green Bank, W. Va., and the National Astronomical Observatory in Arizona.

Unless such institutes or national laboratories are established wherever their need is essential because of the scale of the problem, American science will simply continue to lag in that area of activity.

* * * The national laboratory has emerged to satisfy a number of very well defined needs: First, the need by individual scientists for access to certain large and expensive research apparatus for the conduct of critical experiments; second, the need for the systematic collection of scientific data whose ultimate synthesis and organization is essential to the advancement of basic scientific thought: third, the need to provide opportunity for men of diverse scientific disciplines, unencumbered by extensive teaching commitments, to carry out group research, particularly in the interdisciplinary fields where their joint skills are essential to the solution of difficult and complex problems: and finally, the need for suitable facilities provided in a stimulating atmosphere where thoughtful scientists of many faculties can meet together for extended intervals in the shadow of the best scientific instruments to examine into all facets of particularly challenging and difficult scientific problems with adequate experimental support at hand. * * *

In a speech at a regional conference on the outlook of science in America, conducted by the Massachusetts Institute of Technology on March 1, 1958, Dr. James R. Killian, Jr., made further reference to these problems.[33] Extracts from that speech follow:

* * * We have come to think of basic research as finding its natural home in the university, and indeed the university seems to be the best instrument for conducting basic research. This has not always been true, and we may well be entering a period when other forms of organization will compete with the university in the field of basic research. A few great industrial laboratories have strong basic research programs and an increasing number of Government-operated or Government-sponsored laboratories conduct basic research as indeed they should and must. * * *

But we must also recognize that our research needs are going to require special kinds of institutions separate from the universities. This comes about largely because of the magnitude of equipment and facilities required for much of modern research. The great particle accelerators required by nuclear physics are reaching such size and cost that they no longer can be financed by a university or limited in their use to a single institution. This is becoming true in other fields. In a recent report by the National Academy of Sciences Committee on Meteorology on needs for research

[33] Congressional Record, Mar. 4, 1958, p. A1973.

and education in meteorology, it urged the establishment of a National Institute of Atmospheric Research which could provide the research facilities on a scale required to cope with the global nature of the meteorological problem as described in this report. * * * Other examples could be cited where we need to find new institutional patterns and relationships to provide research facilities adequate to deal with modern research techniques but too expensive to be confined to a single institution. We must develop the counterparts of the research institute in Germany and the U. S. S. R., but we must do it by properly relating them to our universities, and thus avoid a serious weakness in the foreign institutes.

It is also increasingly clear that within institutions it is going to be necessary to create groups of a size sufficiently large to be effective in achieving an integrated approach to certain complex scientific and technological problems. We need to think of how we can establish institutes within educational institutions which make possible a multiple-discipline attack on a problem.

It is the view of the staff that the establishment of national institutes of scientific research, as authorized by this title, will enable this Nation to meet not only its basic scientific research needs, but would make important contributions toward the development of its applied research requirements as well, since authority is provided for the undertaking of certain types of applied scientific research under certain circumstances. It should be noted that the institutes would be operated primarily by private, nongovernmental institutions on a nonprofit basis, with the funds being supplied by the Federal Government, or, in certain instances, in part by private industry. It is contemplated that these institutes would work closely with the scientific and technical departments of existing universities and schools of technology.

Of necessity, the programs undertaken by the institutes should be carried out under the guidance of the best qualified and most creative scientists in the Nation. Although it may be found desirable to have some of these institutes closely associated with existing educational institutions, it might be preferable for others of them to operate as completely separate establishments. This question has been called to the attention of the staff by persons familiar with the field who have pointed out some of the difficulties involved when outstanding scientists, attached to university faculties, are burdened with teaching or administrative duties which detract from their research potential. This is a matter of policy which should be determined by the Congress, following committee hearings.

Related questions

In its initial work on this bill, the staff found that in addition to an urgent need for basic scientific research, there also existed a need for refresher courses for Government scientists who have been engaged in administrative work over a period of years, and for adequate facilities for the advanced training of graduate engineers.

Refresher training for Federal science executives.—With respect to refresher training, the staff was advised by officials of the Govern-

ment who are working in science areas, that scientists who were appointed to administrative positions in the Government 10 or more years ago are actually no longer scientists, but have become administrative officers; that they have lost contact with the latest advancements in the fields of science in which they were formerly proficient; that, although these scientists may be good executives, in order that they may perform the services required of them in accordance with the highest possible standards, they should have refresher courses or periodical assignments involving research in order to keep abreast of the latest developments in their respective fields of science.

National Science University.—As another possible approach to the problem, it was also suggested by some of the scientists and Government officials who are familiar with these problems, that consideration be given to the establishment of a National Science University which would enable administrators of Federal science programs to continue their studies either intermittently or on an alternating or sabbatical basis.

Academy of Science.—Originally, the staff proposed to the committee that a National Academy of Science be created. In view of the opposition that developed on the part of educational leaders and others who were familiar with the problems involved, this proposal was abandoned. It was contended that such an Academy would duplicate the existing facilities of science and technological departments of universities and institutes of technology which are fully qualified in every way to provide undergraduate and graduate instruction in all fields of science. In other words, it was considered that the establishment of an Academy of Science would actually constitute Government control and competition in the field of science education, which, it was contended, would be detrimental to the welfare of existing educational institutions, supported by State or private funds. Concern was also expressed over the political implications of such an institution.

Dr. Wallace R. Brode, president of the American Association for the Advancement of Science, in commenting on this proposal, advised the committee staff that—

> I do not believe an Academy of Science similar to the Military Academy and Naval Academy is practical. Such an Academy of Science would not produce a product for which the Government has an exclusive monopoly of employment as in the case of Army and Navy officers. The many types of scientists in the Government and the similar competitive positions in universities and industries would require specialization institutions such as nuclear, hydraulic, electronic, geological, and mathematical, and experts could not be produced all in the same mold, as are military and naval officers. It should be noted that while the graduates of our military academies are given a bachelor of science degree, the broad military requirements prevent a major in mathematics, languages, history, or psychology and such graduates have considerable difficulty being admitted to graduate standing in universities which adhere to what are considered reasonable admission requirements for advanced study in any specific area or subject.

Facilities for training of graduate scientists.—With respect to adequate graduate facilities for further training of graduate scientists, the staff was advised that there is a real need for such facilities to enable qualified scientists to do basic research or to prepare themselves to teach in scientific fields.

The need for such facilities was clearly stated by Dr. James R. Killian, Jr., special assistant to the President for science and technology, in a speech before the conference on America's Human Resources To Meet the Scientific Challenge held at Yale University, February 3 and 4, 1958. The following are pertinent extracts from Dr. Killian's speech:

> Hopefully, we are coming out of the long period during which science, mathematics, and the languages have been neglected. * * * But the time has come when we do need to recognize the importance of priorities, and the necessity of discriminating choices so that we can temper our prodigality of aims by sobering considerations of quality and concentration.
>
> * * * Until now our chief reliance in engineering education has been on undergraduate preparation—a system which has not universally risen above the training of technicians. While there will long continue to be an appropriate and essential place for the really professional 4-year undergraduate engineering program, it must be supplemented by expanded graduate study in engineering.
>
> Many industries have been ahead of the colleges in recognizing this need. As a consequence, they have evolved training programs of their own to carry their engineers beyond the levels of their 4-year undergraduate education. If we had the graduate school capacity to handle these men, it would be more appropriate and advantageous in the long run for them to receive their advanced training in the university, rather than in industry. The engineer, no less than the scientists, can benefit from an atmosphere of uncommitted research, and our technological advance would be more certain if top graduates of 4-year engineering courses proceeded on to graduate study.
>
> * * * Even though their enrollments have been down, the teaching loads in our engineering schools—exceptions exist, of course—are very high, with the result that their faculties have too little opportunity for the creative work that leads to further professional development both as teachers and engineers. * * *
>
> The success of engineering education in attracting and holding more first-rate teachers will depend upon accelerating the development of more and stronger graduate programs. The graduate school and the research associated with it can provide engineer-teachers with opportunities for professional activities and growth as engineers which they now find chiefly in practice outside of educational institutions. In those engineering institutions where strong graduate schools exist and where there is a fruitful alliance with basic science, an environment satisfying to first-rate engineers has been better achieved.

Summation

In its original consideration of this problem, the staff felt that a National Science Academy might meet the Nation's requirements for basic research, refresher training and graduate technological and scientific study referred to by Dr. Killian. As previously noted, however, after the staff was made aware of the objections to the establishment of an Academy of Science, that proposal was omitted from the bill, and the idea of establishing research institutes or centers, using existing university facilities wherever possible, was developed. The committee may desire to give consideration to broadening the scope of the institutes proposed by this title to enable them to provide advanced graduate training for the younger scientists and refresher training for those with more experience whose administrative duties have resulted in failure to keep abreast of late developments in their specialized fields of science.

Title III. Educational Loans

Section 301 sets forth definitions relative to the terms used in this title.

Section 302 (a) directs that the Secretary shall establish a program providing for loans, and loan insurance, in accordance with the provisions of this title, for the purpose of encouraging and assisting individuals to obtain education beyond the secondary school level in the fields of the physical sciences, to include but not limited to, physics, chemistry, astronomy, geophysics, oceanography, and meteorology, the biological sciences, mathematics, or engineering. The Secretary may establish priorities for such loans or loan insurance for education in particular fields whenever he determines such priorities are in the national interest.

Subsection (b) provides that this title shall be administered by the Administrator under the direction of the Secretary.

Subsection (c) authorizes the Secretary to establish a Bureau of Student Loans under this title to be headed by a Loan Director responsible to the Administrator to assist in carrying out the provisions of this title.

Under subsection (d) the Secretary may establish such rules and regulations as are necessary to carry out the provisions of this title. In establishing such rules and regulations and in carrying out such provisions the Secretary shall consult and cooperate with State agencies primarily concerned with higher education and with established associations of privately endowed colleges and universities.

Section 303 (a) establishes in the Treasury a special fund to be known as the Federal Education Loan and Loan Insurance Fund, which shall be used as a revolving fund for making loans under this title and for loan insurance purposes under this title.

Subsection (b) authorizes appropriations for direct-loan purposes for the fiscal year beginning July 1, 1958, the sum of $40 million; for the fiscal year beginning July 1, 1959, the sum of $60 million; for the fiscal year beginning July 1, 1960, the sum of $80 million; for each of the fiscal years beginning July 1, 1961, 1962, 1963, and 1964, the sum of $100 million; and thereafter so much as shall be necessary to maintain the direct-loan account in the revolving fund, and subsection (c), such amounts as are authorized for loan purposes.

Under section 304 of this title provision is made for the distribution among the States of loans and loan insurance by the Secretary in accordance with such formula as he determines from such information as may be reasonably available to him (1) to be best suited for the purposes of the Science and Technology Act, and (2) to recognize the needs of each State based, among other criteria, on the number of students graduating from secondary schools, the number of young people in selected specific age categories between 17 and 21, the per capita income in such State, and the burden which the State is bearing in higher education through facilities, direct assistance, or otherwise.

Section 305 provides that loans made directly to individuals under the provisions of this title (1) shall be made in such numbers as may be possible with available funds; (2) shall be made upon application in such form and containing such information as may be prescribed by the Secretary; (3) shall be made only in cases where loans from private sources cannot be obtained on terms as favorable to the borrower; except, if study is to be made abroad this requirement need not be met; (4) shall not exceed $1,500 for any academic year of education, and shall not be made for more than 5 such years of education, including postgraduate education at the discretion of the Secretary; (5) shall be made only to individuals certified by an institution of higher education as acceptable for the course of study for which such loan is sought; (6) shall be made without security; except that the borrower shall execute a promissory note payable to the United States, and if the borrower is a minor such note shall bear the endorsement of his or her parent or guardian; (7) shall be due and repayable not later than 10 years after the date on which the borrower ceases to pursue a full-time course of study at an institution of higher education on such terms as the Secretary may prescribe or as shall be approved by him: *Provided*, That the first installment of repayment shall commence not later than 1 year after ceasing full-time study or such sooner time as the student shall accept full-time compensated employment; (8) shall bear interest at 2 per centum per annum or such higher rate as shall be fixed by the Secretary; but no interest shall accrue prior to the commencement period of repayment or 1 year after ceasing full-time study, whichever is sooner; (9) may be made in such installments as the Secretary deems appropriate, and in the event made in such installments, may be discontinued at any time the borrower fails to maintain satisfactory proficiency in the course of study for which the loan is made; (10) shall not be made to any individual for any period during which he is receiving benefits under part VIII of Veterans Regulation Numbered 1 (a), title II of the Veterans' Readjustment Assistance Act of 1952, the War Orphan's Educational Assistance Act of 1956, or any Federal scholarship; and (11) shall be used only to defray the costs, while pursuing a full-time course of study in the fields of the physical or biological sciences, mathematics, or engineering, at an institution of higher education, of tuition, fees, books, supplies, board, lodging, and other expenses necessary to the education being received at such institution.

Section 306 provides that the Secretary may cancel the payment of any loan made or insured under the provisions of this title if the borrower, upon completion of his course of study accepts full-time employment in the Federal Government, or employment on any

project or program designated by the Secretary in the fields of the physical or biological sciences, mathematics, or engineering. Such loans shall be canceled or paid at the rate of $1,500 for each year in which the borrower is employed in a full-time position in the physical or biological sciences, mathematics, or engineering, in any agency of the Federal Government or on any project or program designated by the Secretary and as long as the borrower is so employed all interest on his loan shall be canceled or paid.

Loan insurance provided for under section 307 of this title (1) may be provided for loans not in excess of a cumulative total of $1 billion: *Provided*, That the Secretary shall recommend to the Congress such upward limit as he deems advisable after the first 7 full years of operation of this program and periodically thereafter; (2) shall provide for payment to financial institutions and institutions of higher education of 90 percent of any losses suffered on loans; (3) shall insure only loans meeting the requirements established for direct loans in clauses (4), (5), (7), (8), (9,) (10), and (11) of section 405; provided that the Secretary shall make direct grants to financial institutions and institutions of higher education sufficient to cover the difference between the interest payable by the student over the period covered by the loan and the total interest which the institution receives or requires on similar loans; (4) shall be without charge to the borrower or lender; and (5) shall be subject to such additional terms, conditions, and requirements as the Secretary may determine to be necessary to protect the financial interests of the United States and to carry out the purposes of this title.

Section 308 provides that nothing in this title shall preclude an institution of higher education which loans money subject to insurance from charging a reasonable servicing charge under rules and regulations promulgated hereunder.

ACCEPTANCE OF GRANTS AND BEQUESTS

Under section 309, the Secretary is authorized to accept gifts, grants, bequests, or devises for carrying out the purposes of this Act.

To encourage State assistance in making student loans, the bill would also authorize, under section 310, direct grants up to $200,000 to any one State in any fiscal year to meet operating expenses of nonprofit corporations chartered for the principal purpose of making loans to qualified students. The program, which would be directed by the Secretary of the proposed Department of Science and Technology through the Bureau of Student Loans, created under section 302, would be directed toward providing educational assistance to students in the fields of physical and biological sciences, mathematics and engineering.

Section 311 (a) provides that nothing contained in this title shall be construed to authorize any department, agency, office, or employee of the United States to exercise any direction, supervision, or control over the curriculum or program of instruction of any educational instition or over its administration or personnel.

Subsection (b) requires that so far as practicable, the Secretary shall provide for administration of loans through and in conjunction with the nonprofit corporations referred to in section 410, or when there is no such corporation, through the institution of higher education at

which there are students participating in the program established by this title.

Section 312 authorizes the appropriation of amounts as may be necessary for the administration of this title.

Objective

The basic objective of this title is to provide educational loans specifically for the education of students, beyond the secondary school level, in the physical and biological sciences, mathematics and engineering. Since its coverage would be restricted to these fields, it was the view of the staff that this title should be included in the basic Science and Technology Act. Other legislation, providing either scholarship loans or grants, cover wider fields and are not limited solely to science and technology.

The general objective of this title is covered by a number of other bills which have been introduced in the Senate and referred to the Committee on Labor and Public Welfare, some of which propose loans and others would provide for direct scholarship grants. Senator Hubert H. Humphrey, in introducing S. 3126 in the Senate, pointed out that some members of this committee have sponsored other proposals dealing with the development of civilian science activities in the field of education which have been referred to other committees, and that it would be necessary to coordinate any action that might be taken by this committee with the appropriate jurisdictional committees which were giving consideration to related bills pending before them.

It was the view of the staff that a program for educational loans would be preferable to direct grants, on the premise that many students who had no particular interest in these fields might apply and be awarded scholarships, merely because they were available. The program proposed in this title, it is believed, would insure that only those students who are sincerely interested and had the required qualifications would be likely to avail themselves of the program and the financial responsibility it entails. Conversely under the grants program many of these qualified and deserving students would be precluded from participating due to the fact that other students who had less interest in pursuing science as a career might be able to obtain one of the limited scholarships available under authority of the act, with no intention of continuing in the advanced sciences after the completion of the scholarship period.

Although the bill provides a limitation on the loans not to exceed $1,500 per student for an academic year for a period not to exceed 5 years, it is suggested that the committee give consideration to raising this limit to $2,000 or more per year and for periods up to 6 years, in order to insure that students who qualified will have ample funds to enable them to complete the exacting courses which, it is anticipated, would be required under this program, without the necessity of dividing their time by accepting part-time work to enable them to pay other actual expenses.

One of the most important features of this title is the provision that students who complete the prescribed courses of study, and who accept full-time employment in the Federal Government or employment on any project or program designated by the Secretary in the prescribed fields, would have the loan canceled, including accrued interest, at a

rate equal to each year of service in an amount equal to the yearly loans made under the program.

The objective of this provision is to endeavor to eliminate the present difficulty encountered by the Federal Government in obtaining the services of outstanding graduates in science in competition with private enterprise. The repayment provision would, in the view of the staff, be sufficient to encourage such students to enter the Federal service since they would, in effect, be paid a bonus above the present deficient salaries paid to Federal employees in relation to industry, in an amount equal to loans made for each scholarship year up to the maximum of the years provided under the provisions of this title. It should be kept in mind, however, that a student who obligated himself to the extent of from $7,500 to $12,000 might feel that he has no alternative but to accept employment with or on projects designated by the Government.

At the Conference on American Human Resources to Meet the Scientific Challenge held at Yale University on February 3–4, 1958, Dr. James R. Killian, Jr., took note of the necessity for selective scholarship allocation, stating that—

> the time has come when we need to recognize the importance of priorities, and the necessity of discriminating choices so that we can temper our prodigality of aims by sobering considerations of quality and concentration. At this point, then, in the evolution of our schools, the highest priorities should be given to better provision for our intellectually gifted young people, greater stress placed on the more rigorous teaching of intellectual skills, and higher standards of excellence set for both teachers and pupils.

Title IV. Overseas Programs

This title would authorize the Secretary to establish cooperative programs outside of the United States for collecting, collating, translating, abstracting, and disseminating scientific and technological information and to conduct and support other scientific activities. In carrying out the purposes of this title, the Secretary is authorized, in cooperation with governmental and other agencies, both of the United States and other countries, to use counterpart funds available for expenditure by the United States. A provision was included to waive the requirement for repayment out of appropriations by agencies using counterpart funds for the purposes of the act.

It was suggested by the staff at the time the original bill was drafted that the committee should give consideration to extending the provisions of this title to cover other counterpart funds wherever available when needed. Senator Hubert H. Humphrey, chairman of the Subcommittee on Reorganization of this committee, who also sponsored S. 3126, has introduced a separate bill, S. 3133, to accomplish this objective through the use of facilities of the National Science Foundation and the Secretary of State, which are now available. In a speech in the Senate on February 19, 1958, when he introduced S. 3133, Senator Humphrey commented as follows relative to the objectives of this proposal:

> This bill would authorize the National Science Foundation to establish programs outside of the United States for collect-

ing, collating, translating, abstracting, and disseminating scientific and technological information through the use of so-called counterpart funds. It would also authorize the National Science Foundation to conduct and support scientific activities, including cooperative programs and projects between the United States and other countries. These objectives would be accomplished by utilizing all available agencies and facilities of the Federal Government operating in foreign countries by authorizing such agencies to utilize the currencies, or credits for currencies, in such foreign areas held or available for expenditure by the United States, as well as funds generated through the Mutual Security Act, the Economic Cooperation Act of 1943, or the Agricultural Trade Development and Assistance Act of 1954.

In the implementation of these programs, adequate provisions are made to enable the Secretary of State to enter into executive agreements with such foreign governments where counterpart funds are available for utilization of all credits established under any of these acts in the development of scientific and technological programs. Thus, the proposed program would not be limited, under the provisions of the bill, to the use of administrative funds presently authorized for use by these agencies. A provision similar to the bill I am introducing today has been included in the proposed Science and Technology Act (S. 3126, title IV). I have been informed by the staff of the Committee on Government Operations, which drafted this bill as well as the proposed Science and Technology Act of 1958, which I introduced in the Senate January 27 on behalf of myself, the senior Senator from Arkansas (Mr. McClellan), and the junior Senator from Texas (Mr. Yarborough), that Dr. Wallace R. Brode, the recently appointed chief of the science program in the Department of State, and officials of the National Science Foundation are extremely interested in this proposed legislation. I am sure they will be prepared to give the Congress details as to the possible utilization of these funds in the further development of science and technology both at home and abroad.

As Members of the Senate know, the Department of State has recently reactivated the science attaché program, under Dr. Brode's direction. It is my understanding that he proposes to initiate an aggressive program abroad, through the use of funds made available by the National Science Foundation. Under the bill I am introducing today, if agreements are entered into with foreign countries where counterpart funds are available, it will not be necessary to use appropriated funds since the bill includes a provision waiving the present requirement that participating agencies must repay such funds to the Treasury out of their appropriations.

Under this program, the United States would be able not only to utilize these funds for its most urgent needs—the development of science and technology, so important at this time—but also to develop a program in cooperation with other free nations, designed to bring about a better

balance between fundamental or basic science and applied science or technology, both in this country and abroad.

As all Members of this body know, there has been and still is a deficiency in the development of the fundamental sciences in the United States, even in such important basic science programs as nuclear fission, thermonuclear and missiles developments, the fundamental concepts of which originated from basic science discoveries in European countries. On the other hand, scientists and technologists in the United States are reportedly far ahead of other friendly nations in the application of science and technology. Under the bill I am introducing, adequate machinery would be provided, through the use of credits already established, to bring about a better balance in these areas, by the further development, in this country, of basic science programs originating in European nations and, in turn, by making available to them for their own development the latest advancements in applied science and technology. It is my conviction that the approval of this bill would insure the establishment of balanced scientific development abroad, through basic or applied science, research, and technological institutes in the physical sciences where it is found to be advantageous and such programs are approved by the participating nations.

During the first session of the 85th Congress, a bill sponsored by me and the junior Senator from Arkansas (Mr. Fulbright) which later became law (Public Law 85–141), authorized the utilization of not to exceed $10 million of the mutual security funds by schools and libraries abroad. These funds might have been utilized in support of the scientific information program covered by the first section of the bill I am now introducing. Unfortunately, however, at the insistence of members of the House Committee on Appropriations, this action by the Congress was nullified through the adoption of a rider to the Mutual Security Appropriations Act for 1958 (Public Law 85–279). The subject bill is much broader in its coverage, and, in my opinion, its enactment is urgently needed at this time.

It is my hope that the Committee on Foreign Relations, to which this bill will be referred, will give it immediate consideration. I also hope that the recently created Special Committee on Outer Space, which is directed to study all proposals for the advancement of science and technology, will give this matter its early consideration and submit its recommendations to the Committee on Foreign Relations for appropriate action.

In a speech at a conference on American Human Resources To Meet the World Scientific Challenge held at Yale University on February 3, 1958, Mr. Allen W. Dulles, Director of the Central Intelligence Agency, commented relative to the need for coordination of technical and scientific programs abroad as follows:

* * * I wish to emphasize the value of measures to help pool the scientific assets of the United States with those of the free world wherever it will advance the common good

and mutual defense. Steps in this direction have already been taken. More can and should be done.

* * * If legislative bars against certain phases of our cooperation with other countries in the nuclear field are removed, it will be a major step forward. Exchanging ideas on weapons development will certainly be of value in the field of intelligence since it would improve our ability to analyze and understand the nature of the Soviet nuclear threat.

Other informational exchanges between countries where each has the capacity to help the other will advance the common cause. For us and our allies to keep scores of top scientists working separately and mutually uninformed on the same problems may be a waste of scarce resources that we can ill afford.

Following the Yale conference, a summary statement was issued setting forth the recommendations reached by those participating, the fifth of which was as follows:

> The members of the conference addressed themselves also to the problems arising from the worldwide character of scientific intercourse. The resources which America has invested in technical development of free countries has helped to maintain freedom in the world. Continued and increased scientific cooperation with, and assistance to, both our allies and other free nations was considered an essential part of America's scientific program.

In testimony before the Subcommittee on Information of the House Committee on Government Operations,[34] both Dr. Loyd V. Berkner and Dr. Donald J. Hughes specifically endorsed the use of counterpart funds in developing and promoting scientific cooperation with our allies.

The President, in his message to the Congress on the state of the Union on January 9, 1958, speaking in regard to scientific cooperation with our allies, said:

> It is of the highest importance that the Congress enact the necessary legislation to enable us to exchange appropriate scientific and technical information with friendly countries as part of our effort to achieve effective scientific cooperation.
>
> It is wasteful in the extreme for friendly allies to consume talent and money in solving problems that our friends have already solved—all because of artificial barriers to sharing. We cannot afford to cut ourselves off from the brilliant talents and minds of scientists in friendly countries. The task ahead will be hard enough without handcuffs of our own making.
>
> The groundwork for this kind of cooperation has already been laid in discussions among NATO countries. Promptness in following through with legislation will be the best possible evidence of American unity of purpose in cooperating with our friends.

[34] Hearings, pt. 15, Jan. 20, 21, and 22, 1958, pp. 3464, 3484.

This title of S. 3126 would not only authorize all agencies of the Federal Government to utilize available counterpart funds in connection with the development of science and technology in which these agencies have an interest, either through the National Science Foundation, the science attaché of the Department of State, or on their own initiative, but would permit the full utilization of such funds under agreements entered into by the Secretary of State with nations where such funds exist. The title also is so worded, in the view of the staff, that this Government in cooperation with other countries might make full utilization of the facilities of the North Atlantic Treaty Organization, the Organization for European Economic Cooperation, and other such groups which may be in a position to develop or coordinate science and technological programs abroad.

Proposed Amendments to S. 3126

Suggested amendments and the objectives therefor, some of which are set forth in this memorandum under the appropriate title for consideration by the Special Committee on Astronautical and Outer Space Development, the Committee on Government Operations, at hearings when scheduled, and by other committees as required, are submitted as follows:

1. Restore the original title II creating standing committees on science and technology, as set forth in this memorandum under the appropriate heading,[35] with the following additional changes:

(*a*) That the jurisdiction of the committees be extended to include astronautical and outer-space matters;

(*b*) That the Senate committee membership be raised from 9 to 15, in order that it may be established as a major committee, with other necessary changes to conform to the requirements of the Senate rules in the allocation of majority and minority members to committees; and

(*c*) That provision be made for amendment of Senate rule XVI, to authorize three members of the proposed Senate Committee on Science and Technology to serve ex officio on the Committee on Appropriations on behalf of matters relating to the proposed Department of Science and Technology.

2. Provide that the National Advisory Committee for Aeronautics be transferred to the Department of Science and Technology, where it would exercise its present functions subject to the supervision and direction of the Secretary.

This amendment would bring the National Advisory Committee for Aeronautics within the departmental structure on the same basis as the bill now provides in regard to the National Science Foundation and the Atomic Energy Commission. This amendment is proposed to conform to recent developments in connection with the astronautical and outer space problems, and the insistence on the part of many authorities that the National Advisory Committee on Aeronautics would be the primary agency concerned with any program that may be established for the purpose of outer space exploration.

3. The original title V (title IV of S. 3126) authorized the use of counterpart funds for the development of overseas activities in science and technology. This title has been redrafted to conform to the pro-

[35] The first three of these proposed amendments have been incorporated in a revised staff draft of S. 3126, at pp. 61, 63, 64, 72.

visions of S. 3133, introduced by Senator Hubert H. Humphrey on February 19, 1958, the details of which are set forth in this staff memorandum at pages 52 and 72.

4. Should S. 3126 or a similar bill be approved by the Congress, it would be necessary to repeal those provisions of Senate Resolution 256 which requires that proposed legislation in the field of astronautics and space exploration be referred to the special committee created by Senate Resolution 256.

The objective of this amendment would be to insure that, after the approval of the bill, there would be no conflict with respect to reference of bills relating to outer space which might normally be referred to the special committee.

5. Continue the administration of trademarks under the Department of Commerce, if the Patent Office is transferred to the proposed Department of Science and Technology.[36]

6. Establish a Board of Evaluation in the proposed department or in the Bureau of Technical Services to effect declassification of scientific material when found to be in the public interest; with appropriate amendments to existing laws affecting the Department of Defense and the Atomic Energy Commission, in order to bring about a coordinated program of declassification.[37]

7. Authorize Federal support of a coordination center for scientific and technical information, to be operated through the utilization of public and private facilities.[38]

8. Other Federal scientific activities which should be considered for transfer to the proposed Department of Science and Technology.[39]

9. Insert a section or provision setting forth the general declaration of policy as to the intent and purpose of the proposed Science and Technology Act of 1958. This should include a definition of a "scientist" so as not to preclude the participation of able scientists who may not have certain required degrees in science; a determination as to whether or not the social sciences should be included in title II of the act; and the elimination of preferential treatment for one science over another in the Federal service in terms of grades and salaries.[40]

10. Consideration should be given to the suggested proposal for a program for the exchange of scientists, similar to the State Department's program relating to the exchange of persons, and the Fulbright Scholarship Exchange Act. It is believed that such a program, if approved, should be operated by the Department of Science and Technology rather than through some other agency.

11. Authorize the training of scientific, technical, professional, and administrative personnel of the Department of Science and Technology by public or private agencies. Legislation proposing the granting of such authority is pending before the House Post Office and Civil Service Committee (S. 385 and H. R. 6001). It would provide general authority for departments and agencies to train employees through public or private facilities. Another bill (S. 1340) is pending before this committee, which would authorize the General Services Administration to initiate such a program within that agency.

[36] See p. 6.
[37] See pp. 6 and 7.
[38] See pp. 7, 26–33.
[39] See pp. 11, 12.
[40] See p. 16.

The objective of these bills is to train employees as specialists in certain designated technical fields. It has been suggested to the staff that if a Department of Science and Technology is to be created, that Department would have an urgent need for such authority in order that its key personnel would be authorized to receive training, as required, at conferences, courses or gatherings sponsored by institutions and foundations such as those held under the Brookings executive program.

Public Law 472 of the 81st Congress authorized the National Advisory Committee for Aeronautics to grant to any professional employee who had served with the NACA for not less than 1 year a leave of absence for the purpose of graduate study or research in accredited institutions. These leaves were authorized only for such graduate research or study as would contribute materially to the more effective functioning of the NACA.

During the past 8 years the NACA has granted leave for university graduate study and research in science and engineering to more than 600 different professional employees. Most of the grants of leave were for cumulative periods of a few weeks each, a few were for longer periods, and in half of the cases the employees supplemented their official leave with leave without pay for 50 percent of the period involved. Eighty percent of the persons under the program now are granted graduate leave of a few hours a day to take specialized graduate study at universities near NACA laboratories. This practice has made it possible to increase the number of trained employees with a minimum of interruption to research work.

The NACA officials have found the program to be of notable value in advancing the agency's research work and in developing additional knowledge and skill for its scientists. The graduate study leave program also has been helpful in attracting talented young science and engineering graduates to employment with the NACA.[41]

12. Recommendations have been received from private schools of applied science and technology to the effect that an amendment should be included in title III, so that the term "institution of higher education" would apply not only to private or nonprofit colleges and universities but also, under such regulations as may be prescribed, to qualified colleges and institutions conducting engineering and applied science courses which are provided by institutions operating on a profit basis, and without regard to whether they confer degrees.

13. Title I contains a provision which vests in the proposed Bureau of Technical Services authority to disseminate scientific and technological information. The bill S. 3187 now pending before the Committee on Labor and Public Welfare of the Senate provides for the creation of a science information service within the National Science Foundation.

It is recommended that title XIII of that bill, creating a Science Information Service, be considered in connection with the creation of a Department of Science and Technology in order that this program might be properly coordinated, should the latter bill be approved by the Congress.

WALTER L. REYNOLDS,
Staff Director.

[41] S. Rept. 1329, 85th Cong.

STAFF DRAFT OF PROPOSED SUBSTITUTE FOR S. 3126

A BILL To create a Department of Science and Technology; to create standing Committees on Science and Technology in the Congress; to establish National Institutes of Scientific Research; to authorize a program of Federal loans and loan insurance for college or university education in the physical and biological sciences, mathematics, and engineering; to authorize the establishment of scientific programs outside of the United States; and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SHORT TITLE

SECTION 1. This Act may be cited as the "Science and Technology Act of 1958".

TITLE I—DEPARTMENT OF SCIENCE AND TECHNOLOGY

ESTABLISHMENT

SEC. 101. There is hereby established an executive department of the Government to be known as the United States Department of Science and Technology (hereinafter referred to as the "Department"), at the head of which shall be a Secretary of Science and Technology (hereinafter referred to as the "Secretary"), who shall be appointed by the President, by and with the advice and consent of the Senate, and shall receive compensation at the rate provided by law for heads of the executive departments.

UNDER SECRETARY AND ASSISTANT SECRETARIES

SEC. 102. There shall be in the Department an Under Secretary of Science and Technology, such Assistant Secretaries as shall be determined by the President to be necessary, and a General Counsel, each of whom shall be appointed by the President, by and with the advice and consent of the Senate, shall perform such functions and duties as the Secretary may prescribe, and shall receive compensation at the rate provided by law for under secretaries (other than the Under Secretary of the Department of State), assistant secretaries, and general counsels, respectively, of the executive departments. The Under Secretary (or, during the absence or disability of the Under Secretary, or in the event of a vacancy in the office of the Under Secretary, an Assistant Secretary determined according to such order as the Secretary shall prescribe) shall act as Secretary during the absence or disability of the Secretary or in the event of a vacancy in the office of Secretary.

PROVISIONS OF LAW APPLICABLE TO THE DEPARTMENT

SEC. 103. Except to the extent inconsistent with this Act, all provisions of law applicable to the executive departments generally shall apply to the Department.

SEAL

SEC. 104. The Secretary shall cause a seal of office to be made for the Department, of such design as the President shall approve, and judicial notice shall be taken thereof.

DELEGATION OF AUTHORITY

SEC. 105. The Secretary may, without being relieved of his responsibility therefor, and unless prohibited by some specific provision of law, perform any function vested in him through or with the aid of such officials or organizational entities of the Department as he may designate.

NATIONAL SCIENCE FOUNDATION

SEC. 106. The National Science Foundation, together with its personnel, property, records, obligations, commitments, and the unexpended balances of its appropriations, is transferred to the Department where it shall exercise its functions subject to the supervision and direction of the Secretary.

TRANSFERS FROM THE DEPARTMENT OF COMMERCE

SEC. 107. (a) (1) All functions of the Secretary of Commerce with respect to the Patent Office are transferred to the Secretary.

(2) The Patent Office is transferred to the Department.

(b) (1) All functions of the Secretary of Commerce being administered through the Office of Technical Services in the Department of Commerce (including functions under the Act entitled "An Act to provide for the dissemination of technological, scientific, and engineering information to American business and industry, and for other purposes", approved September 9, 1950 (64 Stat. 823)), and any other functions of such Office, are transferred to the Secretary.

(2) Functions transferred to the Secretary under the provisions of this subsection shall be administered through a component of the Department to be known as the Bureau of Technical Services.

(3) The Bureau of Technical Services shall have responsibility for: (a) the development of a complete science information program, utilizing all facilities of the Federal Government now vested in agencies which operate related programs; (b) acquiring, in cooperation with other public or private agencies, scientific literature, both from foreign and domestic sources; (c) establishing necessary facilities within the Bureau, or in other public or private agencies, to collate, declassify (subject to the requirements of section 5 of the Act of September 9, 1950 (64 Stat. 823)), translate, abstract, index, store, retrieve, and disseminate information essential to the development of scientific and technological programs as may be determined to be in the national interest and consistent with security requirements; and (d) encouraging the elimination of duplication of effort through the integration and coordination of functions vested in the Bureau and in other agencies: *Provided*, That the Bureau may supplement and support services provided by non-Government sources in the field of collecting, translating, or disseminating scientific information.

(4) The Bureau shall have the added responsibility for (a) the development and utilization of mechanical aids and new devices for

collating, translating, abstracting, indexing, storing, and retrieving scientific and technological information under the control of the Federal Government, and to coordinate such data as may be available from other sources; (b) establishing rules and regulations governing the distribution of publications as may be necessary to assure maximum utilization, including the assessment of such fees as may be deemed appropriate; and (c) undertaking through the facilities available to the Secretary, including educational or research institutions and private laboratories, the establishment of such additional services as may be required to further scientific, engineering, and technological research, and aiding in the development of inventions, discoveries, products, processes, and techniques.

(c) (1) The National Bureau of Standards is transferred to the Department and all functions of the Secretary of Commerce being administered through such Bureau are transferred to the Secretary.

(2) The Secretary shall establish a component of the Department separate from the National Bureau of Standards through which he shall administer the functions being carried out through the radio and cryogenic laboratories at Boulder, Colorado.

(d) All officers and other personnel, property, records, obligations, commitments, and unexpended balances of appropriations, allocations, and other funds, which the Director of the Bureau of the Budget determines are used primarily in relation to any office, bureau, or function transferred under the provisions of this section, are transferred to the Department.

ATOMIC ENERGY COMMISSION

SEC. 108. The Atomic Energy Commission, together with its personnel, property, records, obligations, commitments, and the unexpended balances of its appropriations, is transferred to the Department where it shall exercise its functions subject to the supervision and direction of the Secretary and shall be known as the Atomic Energy Administration of the Department of Science and Technology.

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

SEC. 109. The National Advisory Committee for Aeronautics, together with its personnel, property, records, obligations, commitments, and the unexpended balances of its appropriations, is transferred to the Department where it shall exercise its functions subject to the supervision and direction of the Secretary.

TRANSFERS FROM SMITHSONIAN INSTITUTION

SEC. 110. (a) The following functions of the Smithsonian Institution are transferred to the Secretary:

(1) All functions being administered through the Division of Astrophysical Research;

(2) All functions being administered through the Division of Radiation and Organisms;

(3) All functions transferred to such Institution under the provisions of part VIII of Reorganization Plan Numbered 3 of 1946 (relating to the Canal Zone Biological Area);

(4) All functions with respect to the exchange of scientific publications being administered through the International Exchange Service; and

(5) Any other functions of such Institution which are determined by the Director of the Bureau of the Budget to relate primarily to scientific research not related to museum or zoological purposes.

(*b*) All personnel, property, records, obligations, commitments, and unexpended balances of appropriations, allocations, and other funds, which the Director of the Bureau of the Budget determines are used primarily in relation to any function transferred under the provisions of this section, are transferred to the Department.

(c) Nothing in this section shall be deemed to authorize any transfer which in the opinion of the Attorney General cannot be made because of the provisions of a private bequest or other grant to such Institution.

TRANSFER MATTERS

SEC. 111. All laws relating to any agency or function transferred under this Act shall, insofar as such laws are not inapplicable, remain in full force and effect. Any transfer of personnel pursuant to this Act shall be without change in classification or compensation, except that this requirement shall not operate to prevent the adjustment of classification or compensation to conform to the duties to which such transferred personnel may be assigned. All orders, rules, regulations, permits, or other privileges made, issued, or granted by any agency or in connection with any functions transferred by this Act, and in effect at the time of the transfer, shall continue in effect to the same extent as if such transfer had not occurred, until modified, superseded, or repealed. No suit, action, or other proceeding lawfully commenced by or against any agency or any officer of the United States acting in his official capacity shall abate by reason of any transfer made pursuant to this Act, but the court, on motion or supplemental petition filed at any time within twelve months after such transfer takes effect, showing a necessity for a survival of such suit, action, or other proceeding to obtain a settlement of the questions involved, may allow the same to be maintained by or against the appropriate agency or officer of the United States.

EXPENDITURES AUTHORIZED

SEC. 112. The Secretary is authorized to make such expenditures (including expenditures for personal services and rent at the seat of government and elsewhere, for lawbooks, books of reference and periodicals, and for printing and binding) as may be necessary to carry out the provisions of this Act, and as may be provided for by the Congress from time to time.

REPORTS TO CONGRESS

SEC. 113. The Secretary shall make at the close of each fiscal year a report in writing to Congress giving an account of all moneys received and disbursed by him and the Department, describing the work done by the Department, and making such recommendations as he shall deem necessary for the effective performance of the duties and purposes of the Department.

AMENDMENT

SEC. 114. Section 158 of the revised Statutes of the United States, as amended (5 U. S. C. 1), is amended by inserting at the end thereof the following:

"Eleventh: The Department of Science and Technology."

APPROPRIATIONS AUTHORIZED

SEC. 115. There are authorized to be appropriated such sums as may be necessary to enable the Department to carry out the provisions of this Act and to perform any other duties which may be imposed upon it by law.

EFFECTIVE DATE

SEC. 116. The provisions of this title shall be effective on the date of enactment of this Act except that sections 106 through 111 shall be effective after ninety days following such date of enactment.

TITLE II—SENATE AND HOUSE STANDING COMMITTEES ON SCIENCE AND TECHNOLOGY

PART I—CHANGES IN RULES OF SENATE AND HOUSE

RULEMAKING POWER OF THE SENATE AND HOUSE

SEC. 201. The following sections of this part are enacted by the Congress:

(1) As an exercise of the rulemaking power of the Senate and the House of Representatives, respectively, and as such they shall be considered as part of the rules of each House, respectively, or of that House to which they specifically apply; and such rules shall supersede other rules only to the extent that they are inconsistent therewith; and

(2) With full recognition of the constitutional right of either House to change such rules (so far as relating to the procedure in such House) at any time, in the same manner and to the same extent as in the case of any other rule of such House.

SENATE

SEC. 202. (a) Rule XXV of the Standing Rules of the Senate (relating to standing committees) is amended by inserting in paragraph 1 after part (o) the following new part:

"(p) Committee on Science and Technology, to consist of fifteen Senators, to which committee shall be referred all proposed legislation, messages, petitions, memorials, and other matters relating to the following subjects:

"1. Basic and applied science and technology, generally, not primarily with respect to the Department of Defense and its functions.

"2. The development, use, or control of atomic energy.

"3. Astronautics and space exploration.

"4. The Department of Science and Technology generally."

(b) Effective for the remainder of the Eighty-fifth Congress, paragraph 4 of Rule XXV of the Standing Rules of the Senate is amended to read as follows:

"4. (a) Each Senator shall serve on two standing committees and no more; except that not to exceed twenty-four Senators of the majority party, and not to exceed twelve Senators of the minority party, who are members of the Committee on the District of Columbia, the Committee on Government Operations, the Committee on Post Office and Civil Service, or the Committee on Science and Technology may serve on three standing committees and no more.

"(b) In the event that during the Eighty-fifth Congress members of one party in the Senate are replaced by members of the other party, the thirty third-committee assignments shall in such event be distributed in accordance with the following table:

"Senate seats		Third-committee assignments	
Majority	Minority	Majority	Minority
48	48	26	10
49	47	24	12
50	46	22	14
51	45	20	16"

(c) Effective at the beginning of the Eighty-sixth Congress, paragraph 4 of rule XXV of the Standing Rules of the Senate is amended to read as follows:

"4. Each Senator shall serve on two standing committees and no more; except that not to exceed twenty-two Senators of the majority party, and not to exceed ten Senators of the minority party, who are members of the Committee on the District of Columbia, the Committee on Government Operations, the Committee on Post Office and Civil Service, or the Committee on Science and Technology may serve on three standing committees and no more."

(d) Subparagraph (a) of paragraph 6 of rule XVI of the Standing Rules of the Senate is amended by striking out the material with respect to the Senate members of the Joint Committee on Atomic Energy and inserting in lieu thereof the following: "Committee on Science and Technology—For the Department of Science and Technology."

HOUSE

SEC. 203. (a) Part 1 of rule X of the Rules of the House of Representatives is amended by adding at the end thereof the following:

"(t) Committee on Science and Technology to consist of twenty-five Members."

(b) Rule XI of the Rules of the House of Representatives is amended by adding immediately after part 19 thereof the following:

"19A. Committee on Science and Technology.

"(a) Basic and applied science and technology, generally, not primarily with respect to the Department of Defense or its functions.

"(b) The development, use, or control of atomic energy.

"(c) Astronautics and space exploration.

"(d) The Department of Science and Technology generally."

SEC. 204. (a) Each Member of the Senate and the House of Representatives who immediately prior to the effective date of this title is a member of the Joint Committee on Atomic Energy shall be appointed as one of the initially appointed members of the Committee on Science and Technology of the House in which such Member serves.

(b) For the purpose of determining seniority of service on the Committee on Science and Technology of the Senate or of the House of

Representatives, consecutive service until the effective date of this title on the Joint Committee on Atomic Energy shall, in the case of members initially appointed to each such Committee on Science and Technology, be considered as service on such Committee.

PART II—AMENDMENTS TO ATOMIC ENERGY ACT OF 1954

SECTION 11

SEC. 210. Section 11 of the Atomic Energy Act of 1954, as amended, is amended by striking out clause l.

SECTIONS 51, 61, AND 164

SEC. 211. The last sentences of sections 51, 61, and 164 of such Act are amended by striking out "Joint Committee" wherever it appears in such sentences and inserting in lieu thereof "Congress", and by striking out "resolution in writing" and inserting in lieu thereof "concurrent resolution".

SECTION 58

SEC. 212. Section 58 of such Act is amended by striking out "Joint Committee" wherever it appears in such section and inserting in lieu thereof "Congress", and by striking out "resolution" and inserting in lieu thereof "concurrent resolution".

SECTION 123

SEC. 213. Clause c. of section 123 of such Act is amended by striking out "Joint Committee" and inserting in lieu thereof "Congress".

SECTION 170

SEC. 214. Subsection i. of section 170 of such Act is amended by striking out "Joint Committee" wherever it appears in such subsection and inserting in lieu thereof "Congress".

CHAPTER 17 REPEALED

SEC. 215. The Joint Committee on Atomic Energy of the Congress is abolished, and such Act is amended by striking out chapter 17 and inserting in lieu thereof the following:

"CHAPTER 17. COMMITTEES ON SCIENCE AND TECHNOLOGY OF THE SENATE AND THE HOUSE OF REPRESENTATIVES

"SEC. 201. REPORTS.—The Commission shall keep the Committees on Science and Technology of the Senate and the House of Representatives fully and currently informed with respect to all the Commission's activities. The Department of Defense shall keep such committees fully and currently informed with respect to all matters within the Department of Defense relating to the development, utilization, or application of atomic energy. Any Government agency shall furnish any information requested by either such committee with respect to the activities or responsibilities of that agency in the field of atomic energy.

"SEC. 202. CLASSIFICATION AND PROTECTION OF INFORMATION.—The Committee on Science and Technology of the Senate or of the House of Representatives may classify information with respect to atomic energy originating within the committee in accordance with standards used generally by the executive branch for classifying restricted data or defense information. Either such committee is authorized to permit such of its members, employees, and consultants as it deems necessary in the interest of common defense and security to carry firearms while in the discharge of their official duties for the committee.

"SEC. 203. RECORDS.—All committee records, data, charts, and files with respect to atomic energy of either the Committee on Science and Technology of the Senate or of the House of Representatives shall be the property of such committee and shall be kept in the offices of such committee or other places as the committee may direct under such security safeguards as the committee shall determine in the interest of common defense and security."

TABLE OF CONTENTS

SEC. 216. The table of contents of such Act is amended by striking out the material with respect to chapter 17 and inserting in lieu thereof the following:

"CHAPTER 17. COMMITTEES ON SCIENCE AND TECHNOLOGY OF THE SENATE AND THE HOUSE OF REPRESENTATIVES

"Sec. 201. Reports.
"Sec. 202. Classification and Protection of Information.
"Sec. 203. Records."

RECORDS OF JOINT COMMITTEE

SEC. 217. All records, data, charts, files, proposed legislation, messages, petitions, memorials, and other such material of the Joint Committee on Atomic Energy shall be disposed of in accordance with the directions of such Joint Committee to be issued within thirty days after the date of enactment of this Act.

EFFECTIVE DATE

SEC. 218. The provisions of this title shall be effective after thirty days following the date of enactment of this Act except that section 217 shall be effective on such date.

TITLE III—NATIONAL INSTITUTES OF SCIENTIFIC RESEARCH

DECLARATION OF POLICY AND PURPOSE

SEC. 301. The Congress finds that there is an urgent need for a greatly expanded program of scientific research in the United States if this Nation is to maintain its position of world leadership. The Congress finds further that the national interest requires that the United States Government afford creative scientists in the United States the environment and advanced facilities most conducive to the conduct of scientific research, either by means of the establishment of

research centers, or by making available the funds, incentive, and encouragement necessary to enable the establishment or support of such centers through nonprofit organizations outside the Federal Government. It is the purpose of this title to encourage the establishment and support of scientific research centers for the conduct of basic and applied scientific research, as the national interest may require, through making possible adequate financial support to attract the most talented, qualified, and creative scientists in the Nation.

RESEARCH INSTITUTES FOR BASIC RESEARCH

SEC. 302. The Secretary is hereby authorized to establish, or to support the establishment of, one or more research centers or institutes in each of the following fields: Mathematics; engineering; the physical sciences, to include but not limited to, physics, chemistry, astronomy, geophysics, oceanography, and meteorology; the biological sciences; and the social sciences. Such research centers or institutes shall be devoted primarily to the conduct of basic scientific research, and may be operated by the Secretary directly or through support to private, nongovernmental institutions or agencies.

RESEARCH INSTITUTES FOR APPLIED RESEARCH

SEC. 303. Whenever the Secretary finds that the national interest clearly requires the undertaking of certain types of applied scientific research and that sufficient economic incentive does not exist for the undertaking of such research by nongovernmental organizations without governmental support, he may establish research institutes or support such applied research. Such research institutes may be operated either directly, or on a contract basis through nongovernmental organizations.

REQUIREMENT

SEC. 304. No scientific research center or institute established or supported pursuant to this title shall be of a profit making character; nor shall any such research center or institute be established under this title if it would duplicate existing research facilities which are available for performing such work.

ADMINISTRATION

SEC. 305. Each research center or institute established and operated by the Secretary pursuant to this title shall be under the direction of a director appointed by the Secretary, who shall receive compensation at a rate not in excess of that provided for the Under Secretary of the Department. Each such director may, in accordance with such policies as the Secretary shall from time to time prescribe, appoint and fix the compensation of two associate directors and such other personnel as may be necessary. Scientific and professional personnel may be appointed and compensated without regard to the civil service laws and the Classification Act of 1949.

REPORTS BY DIRECTORS

SEC. 306. The directors of institutes established and operated by the Secretary pursuant to this title, shall report annually to the Secretary as to the research programs undertaken and planned within each such institute.

REPORTS BY SECRETARY

SEC. 307. The Secretary shall report annually to the Congress, for each preceding year, with respect to the research institutes established and supported, the nature of the programs undertaken, the cost of such programs, and the estimates of cost for each succeeding year.

TITLE IV—EDUCATIONAL LOANS

DEFINITIONS

SEC. 401. As used in this title—

(1) The term "Administrator" means the Administrator of Scientific and Technological Education, Department of Science and Technology;

(2) The term "Loan Director" means the Student Loan Director designated under this title;

(3) The term "State" means a State, Alaska, the Canal Zone, the District of Columbia, Hawaii, Puerto Rico, or the Virgin Islands;

(4) The term "institution of higher education" means a public or private nonprofit college or university; and

(5) The term "financial institution" means a financial or credit institution (including any insurance company) which is subject to examination and supervision by an agency of the United States or of any State.

ESTABLISHMENT OF LOAN AND LOAN INSURANCE PROGRAM

SEC. 402. (a) The Secretary shall establish a program providing for loans, and loan insurance, in accordance with the provisions of this title, for the purpose of encouraging and assisting individuals to obtain education beyond the secondary school level in the fields of the physical sciences, to include but not limited to, physics, chemistry, astronomy, geophysics, oceanography, and meteorology, the biological sciences, mathematics, and engineering. The Secretary may establish priorities for such loans or loan insurance for education in particular fields whenever he determines such priorities are in the national interest.

(b) The provisions of this title shall be administered by the Administrator under the direction of the Secretary.

(c) The Secretary may establish a Bureau of Student Loans under this title to be headed by a Loan Director responsible to the Administrator to assist in carrying out the provisions of this title.

(d) The Secretary may establish such rules and regulations as are necessary to carry out the provisions of this title. In establishing such rules and regulations and in carrying out such provisions the Secretary shall consult and cooperate with State agencies primarily concerned with higher education and with established associations of privately endowed colleges and universities.

FEDERAL LOAN AND LOAN INSURANCE FUND

SEC. 403. (a) There is hereby established in the Treasury a special fund to be known as the "Federal Education Loan and Loan Insurance Fund", which shall be used as a revolving fund for making loans under this title and for loan insurance purposes under this title.

(b) There are authorized to be appropriated to the fund for direct loan purposes for the fiscal year beginning July 1, 1958, the sum of $40,000,000; for the fiscal year beginning July 1, 1959, the sum of $60,000,000; for the fiscal year beginning July 1, 1960, the sum of $80,000,000; for each of the fiscal years beginning July 1, 1961, 1962, 1963, and 1964, the sum of $100,000,000; and thereafter so much as shall be necessary to maintain the direct loan account in the revolving fund.

(c) There are authorized to be appropriated to the fund such amounts as are necessary for loan insurance purposes.

DISTRIBUTION AMONG STATES

SEC. 404. The Secretary shall provide for the distribution among the States of loans and loan insurance under the provisions of this title, in accordance with such formula as he determines from such information as may be reasonably available to him (1) to be best suited for the purposes of this title, and (2) to recognize the needs of each State based, among other criteria, on the number of students graduating from secondary schools, the number of young people in selected specific age categories between 17 and 21, the per capita income in such State, and the burden which the State is bearing in higher education through facilities, direct assistance, or otherwise.

DIRECT LOANS

SEC. 405. Loans made directly to individuals under the provisions of this title—

(1) shall be made in such numbers as may be possible with available funds;

(2) shall be made upon application in such form and containing such information as may be prescribed by the Secretary;

(3) shall be made only in cases where loans from private sources cannot be obtained on terms as favorable to the borrower; except, if study is to be made abroad this requirement need not be met;

(4) shall not exceed $1,500 for any academic year of education, and shall not be made for more than five such years of education, including postgraduate education at the discretion of the Secretary;

(5) shall be made only to individuals certified by an institution of higher education as acceptable for the course of study for which such loan is sought;

(6) shall be made without security; except that the borrower shall execute a promissory note payable to the United States, and if the borrower is a minor such note shall bear the endorsement of his or her parent or guardian;

(7) shall be due and repayable not later than ten years after the date on which the borrower ceases to pursue a full-time course of study at an institution of higher education on such terms as the

Secretary may prescribe or as shall be approved by him: *Provided*, That the first installment of repayment shall commence not later than one year after ceasing full-time study or such sooner time as the student shall accept full-time compensated employment;

(8) shall bear interest at 2 per centum per annum or such higher rate as shall be fixed by the Secretary; but no interest shall accrue prior to the commencement period of repayment or one year after ceasing full-time study, whichever is sooner;

(9) may be made in such installments as the Secretary deems appropriate, and in the event made in such installments, may be discontinued at any time the borrower fails to maintain satisfactory proficiency in the course of study for which the loan is made.

(10) shall not be made to any individual for any period during which he is receiving benefits under part VIII of Veterans Regulation Numbered 1 (a), title II of the Veterans' Readjustment Assistance Act of 1952, the War Orphan's Educational Assistance Act of 1956, or any Federal scholarship; and

(11) shall be used only to defray the costs, while pursuing a full-time course of study in the fields of the physical or biological sciences, mathematics, or engineering, at an institution of higher education, of tuition, fees, books, supplies, board, lodging, and other expenses necessary to the education being received at such institution.

CANCELLATION AND PAYMENT OF LOANS

SEC. 406. The Secretary may provide for the cancellation or payment of any loan made or insured under the provisions of this title if the borrower, upon completion of his course of study accepts full-time employment in the Federal Government, or employment on any project or program designated by the Secretary in the fields of the physical or biological sciences, mathematics, or engineering. Such loans shall be canceled or paid at the rate of $1,500 for each year in which the borrower is employed in a full-time position in the physical or biological sciences, mathematics, or engineering, in any agency of the Federal Government or on any project or program designated by the Secretary and as long as the borrower is so employed all interest on his loan shall be canceled or paid.

LOAN INSURANCE

SEC. 407. Loan insurance provided for under this title—

(1) may be provided for loans not in excess of a cumulative total of $1,000,000,000: *Provided*, That the Secretary shall recommend to the Congress such upward limit as he deems advisable after the first seven full years of operation of this program and periodically thereafter;

(2) shall provide for payment to financial institutions and institutions of higher education of 90 per centum of any losses suffered on loans;

(3) shall insure only loans meeting the requirements established for direct loans in clauses (4), (5), (7), (8), (9), (10), and (11) of section 405; provided that the Secretary shall make direct grants to financial institutions and institutions of higher educa-

tion sufficient to cover the difference between the interest payable by the student over the period covered by the loan and the total interest which the institution receives or requires on similar loans;

(4) shall be without charge to the borrower or lender; and

(5) shall be subject to such additional terms, conditions, and requirements as the Secretary may determine to be necessary to protect the financial interests of the United States and to carry out the purposes of this title.

LIMITED SERVICE FEES

SEC. 408. Nothing in this title shall preclude an institution of higher education which loans money subject to insurance from charging a reasonable servicing charge under rules and regulations promulgated hereunder.

ACCEPTANCE OF GRANTS AND BEQUESTS

SEC. 409. The Secretary is authorized to accept gifts, grants, bequests, or devises for carrying out the purposes of this Act.

GRANTS TO STATES AND APPROPRIATIONS AUTHORIZED

SEC. 410. For the purpose of encouraging State assistance in facilitating the availability of loans to students in institutions of higher education engaged in a course of study in the fields of the physical or biological sciences, mathematics, or engineering, the Secretary is authorized to make direct grants of not more than $200,000 to any one State in any fiscal year which shall be kept in a separate fund under the control of the State agency charged with chief concern over institutions of higher education. Such funds shall be made available to help meet the organization and operating expenses of nonprofit corporations chartered for the principal purpose of providing loan programs for students of the State desiring to further their education beyond high school in the fields of the physical or biological sciences, mathematics, or engineering. There are authorized to be appropriated such amounts as may be necessary for the payments authorized in this section.

PROHIBITION OF FEDERAL CONTROL; AND ADMINISTRATION THROUGH STATE AGENCIES AND INSTITUTIONS

SEC. 411. (a) Nothing contained in this title shall be construed to authorize any department, agency, office, or employee of the United States to exercise any direction, supervision, or control over the curriculum or program of instruction of any educational institution or over its administration or personnel.

(b) So far as practicable, the Secretary shall provide for administration of loans through and in conjunction with the nonprofit corporations referred to in section 410, or when there is no such corporation, through the institution of higher education at which there are students participating in the program established by this title.

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ADMINISTRATIVE APPROPRIATIONS AUTHORIZED

SEC. 412. There are authorized to be appropriated such amounts as may be necessary for the administration of this title.

TITLE V—OVERSEAS PROGRAMS

AUTHORIZATION

SEC. 501. The Secretary is authorized to establish programs outside of the United States for collecting, collating, translating, abstracting, and disseminating scientific and technological information, and to conduct and support other scientific activities, including cooperative programs and projects between the United States and other countries. Notwithstanding section 1415 of the Supplemental Appropriation Act, 1953, section 105 of the Agricultural Trade Development and Assistance Act of 1954, or any other provision of law, the Secretary may, in carrying out the provisions of this title, or, in cooperation with governmental and other agencies, use currencies, or credits for currencies, of any foreign government (1) held or available for expenditure by the United States and not required by law or agreement with such government to be expended or used for any other purpose, or (2) made available under the provisions of section 502 of this title.

ADDITIONAL FUNDS

SEC. 502. In order to make additional funds available for the purposes of this title the Secretary of State is authorized to enter into an executive agreement or agreements with any foreign government for the use of currencies, or credits for currencies, of such government deposited pursuant to agreements entered into under section 142 (b) of the Mutual Security Act of 1954, or section 115 (b) (6) of the Economic Cooperation Act of 1948, or pursuant to section 105 of the Agricultural Trade Development and Assistance Act of 1954.

APPENDIX A

THE FEDERAL SCIENCE PROGRAM

The following are extracts from documents, articles, and other mediums relating to the operations of the Government in scientific and technological fields:

NATIONAL SCIENCE FOUNDATION

Organization of the Federal Government for Scientific Activities, 1956

Government organization for scientific activities is extensive and complex. Scientific activities are diversely distributed among many Federal agencies. * * * 38 of the 80 agencies are engaged to some extent in scientific activities. These activities result from their efforts to carry out congressionally assigned functions. The functions may be specifically scientific in nature or may require scientific activity incidental to their performance.

Many of these 38 agencies have established elaborate organizational structures to conduct their scientific activities. They may have extremely varied research programs encompassing numerous fields and disciplines of science and dealing with basic and/or applied research. Other activities deal with administration and planning of research, expansion of research facilities, dissemination of scientific information, training of scientific manpower, and collection of general purpose statistics in both the natural and social sciences.

Trends in the Employment and Training of Scientists and Engineers, 1956

During the past 5 years, it has become increasingly clear that we are not training enough highly qualified scientists and engineers to meet our expanding needs. It now appears that only unusual measures can assure a supply of well-trained scientists and engineers adequate for our requirements. * * *

Serious doubts are being expressed that enough scientists and engineers are being trained to meet the requirements of the economy and national defense. The supply relative to demand has deteriorated since 1950. A decline in college-age population came at a time when our needs were expanding in an unprecedented economic growth. * * *

Despite the considerable increase in the proportion of our youth who continue education beyond high school, there are still large numbers who discontinue formal education before college. Many of them might have become the teachers, the research scientists, and the engineers so eagerly sought today. Whether or not science and technology can enlist larger numbers of capable young people will depend, under our system of free choice, upon the opportunities and challenges that can be presented to them. * * *

Federal Funds for Science. VI. The Federal Research and Development Budget, Fiscal Years 1956, 1957, and 1958

Twenty-three departments, offices, agencies, and establishments of the executive branch of the Federal Government administer funds for scientific research and development, ranging in amounts from less than $50,000 to more than $2 billion. * * *

Together the Department of Defense and the Atomic Energy Commission account for 88, 85, and 82 percent of the total funds respectively in 1956, 1957, and 1958. The total obligations of the Defense Department are estimated to have increased over 10 percent from fiscal year 1956 to 1957, and those of the Atomic Energy Commission by almost 60 percent. However, primarily as a result of the more than 100-percent increase in obligations of the Department of Health, Education, and Welfare, the proportion of the total funds administered by the Department of Defense and the Atomic Energy Commission declined in 1957. In 1958 the obligations of these two agencies are expected to be practically unchanged. A number of other agencies, namely, the Departments of Agriculture, Interior, and Commerce, and the National Advisory Committee for Aeronautics, are expected to have expanding scientific research and development programs.

About 45 percent of the total Defense Department funds are administered by the Air Force. The Navy ranks next, and the Army accounts for somewhat less than one-fourth of the Department's obligations. * * *

The National Bureau of Standards, the Weather Bureau, and the Maritime Administration were primarily responsible for the 35-percent advance in the Department of Commerce obligations for scientific research and development in fiscal year 1957. In the Department of the Interior, the Bureau of Mines, Fish and Wildlife Service, and Geological Survey are the major research organizations and account for most of the fiscal year 1957 increase of almost 25 percent. Obligations for expansion of research and development plant increased more than did funds for the conduct of research and development in the National Advisory Committee for Aeronautics in fiscal year 1957. * * *

Classification of the total obligations for conduct of research and development on the basis of the character of work demonstrates the Federal Government's concern for the practical and the useful in the allocation of the funds. More than 60 cents of every dollar for research and development is obligated for development; less than 40 cents for research, both basic and applied; and approximately 8 cents of the latter goes into basic research. In fiscal year 1957, total obligations for development amounted to $1.7 billion; for research, $964 million, of which $218 million was obligated for basic research. On the basis of the President's budget, an increase was anticipated in each of these categories in fiscal year 1958; however, congressional action has probably modified this expectation. * * *

Out of a total of $964 million obligated for research in fiscal year 1957, the life sciences accounted for $281 million, the physical sciences for $647 million, and the social sciences for $35 million, or 29, 67, and 4 cents, respectively, of each research dollar. * * *

Sixteen of the twenty-three agencies reporting funds for research in 1957 obligated a portion of their funds for the physical sciences. The $647 million for total physical science research in fiscal year 1957 was distributed among the physical sciences proper, i. e., physics, chemistry, earth sciences, etc., mathematical sciences, and engineering sciences. The last accounted for two-thirds of of the total, but the mathematical sciences only covered 1 percent. The major

portion of the funds for the engineering sciences was obligated by the Department of Defense. For the physical sciences proper, funds for the International Geophysical Year placed the National Science Foundation next to the Atomic Energy Commission and the Department of Defense in obligations. Obligations for research in the mathematical sciences were administered almost equally by the three military services of the Department of Defense, the Atomic Energy Commission, and the National Science Foundation. * * *

In fiscal year 1948, Federal Government expenditures for scientific research and development reached a low point of just over $850 million from the 1945 peak of $1.6 billion. Since that time, with one exception, namely, in fiscal year 1954, expenditures have climbed steadily to an estimated level of $2.8 billion in fiscal year 1957, which is more than a threefold increase from the postwar low. This threefold increase is greater than that occurring in the total Federal budget for all purposes during this period, thus illustrating the Government's increased reliance on scientific research and development.

Basic Research—A National Resource, 1957

In the national security the objectives have in recent years acquired a measure of added urgency because of the special and significant attention given to basic research in the Soviet Union. Their attainment implies not only adequate funds for research from both private and Government sources, but equally important an increasing emphasis on science education in all its phases and at all levels from school and college through graduate training. It implies also the teaching of science and research in science as cultural activities, to be undertaken for man's increasing understanding, hence giving them importance and meaning to laymen as well as professional investigators. * * *

The executive branch of the Federal Government is made up of 80 organizations, including all departments, agencies, boards, and commissions. In 1953–54 almost half of the organizations were engaged in a wide variety of scientific activities including the conduct of research and development. * * *

Generally speaking, these Federal research and development activities were carried out through federally owned and operated laboratories, contracts with private industry, grants and contracts involving educational and other nonprofit instituations, and contract research centers exclusively or chiefly financed by Federal funds.

* * * Research and development conducted by the Federal agencies themselves cost about $970 million. The Department of Defense accounted for about four-fifths of this total. A substantial proportion of all work carried out in military laboratories was developmental in character.

On the other hand, the laboratories of civilian agencies—such as the National Advisory Committee for Aeronautics, and the Departments of Commerce, Agriculture, the Interior, and Health, Education, and Welfare—performed research predominatly applied and some basic. All but the last of these civilian agencies performed two-thirds or more of the work which they financed. Two agencies performed no research and development or virtually none: the Atomic Energy Commission, and the National Science Foundation which is forbidden by law to operate laboraties. The National Advisory Committee for Aeronautics, on the other hand, is an agency which is directed to conduct research and therefore must operate its own laboratories.

About two-thirds of the Federal research-and-development funds—$1.8 billion—was for work performed outside Federal laboratories. * * * The Department of Defense and the Atomic Energy Commission played a dominant role in allocating the extramural funds of the Federal Government.

Competition among nations in basic research is normal, and publication of results assures availability of its benefits to all. But a nation that is making strong efforts in its industrial and agricultural development and correspondingly improving the general economy and the health of its people cannot sit back complacently and await the results of basic research published by the scientists of other countries. In its own interest a nation needs to be on its own, and pull its share of the load. The volume of output of good basic research is one factor in the rating of a nation's status in the family of nations. * * *

The Soviet situation may well produce a more effective balance between basic research and applied research-development than that existing in the younger and more technologically oriented system of the United States. As we continue the effort to maintain our relative position, indeed to excel, in basic research, we must remain aware of the large reservoir of untapped manpower in the Soviet Union and the availability of ample funds for the support of future scientists and engineers. * * *

It is in the national interest that all results of basic research, wherever it is done, be published promptly. This applies to basic research in industrial laboratories as well as laboratories of universities or Government. Indeed, the view is widely held that until the results have been published, research has not been carried to completion, for its value can develop only as the new knowledge is widely disseminated. Publication is the vehicle, and the cost of publication is an essential part of the cost of research. * * *

The annals of science include many cases of "lost" data, significant papers which did not come to the attention of investigators for years or decades after publication. The result of such cases in the past has been unnecessary duplication of effort, the waste of investigators' time and funds, and delays in the progress of research. The situation continues to be a source of considerable concern, perhaps more so today than ever before, as the volume of published information increases throughout the world. * * *

Many scientists and administrators who are close to the problem feel that there is a definite need for a centralized facility to help achieve more effective communications in research. The facility would handle translating, indexing, coding, and other activities on a coordinated basis. It would be responsible for all measures designed to promote the more rapid retrieval and communication of published work. This suggestion is made in recognition of the fact that since interchange of new knowledge within one country is important, a full interchange of research information among all scientists is vital to the advancement of science. * * *

The conduct of basic research would be stimulated if the Federal Government increased its support of basic research at institutions of higher learning, particularly at universities with graduate schools. The increase might properly reach the point where total funds from all sources were adequate to support fully the competent research workers in all departments, including engineering and medicine, who were available and wished to do basic research. The institution, of course, would determine availability. * * *

The importance of the university and college to the Nation's advancement in basic research, and hence to the Nation's progress through the benefits of research, cannot be rated too highly. These institutions therefore have a responsibility, generally acknowledged as one of their traditional functions, of maintaining high productivity of their research scholars and excellence in their scholarship. Faculty members with ability and interest in research should be given all possible encouragement to devote their full time to doing research, and to teaching and training students. Encouragement is best offered in providing salaries sufficient to minimize personal financial problems, along with suitable facilities. They should not be required or expected to seek outside consultation to supplement income. Such diversion from their primary responsibility, especially during the academic year, can be detrimental to their competence in both teaching and research.

JOHN C. HONEY, FORMER STUDY DIRECTOR FOR GOVERNMENTAL RESEARCH, NATIONAL SCIENCE FOUNDATION [42]

Federal Government Organization and Programs for Research and Development—An Overview. Federal Bar Journal, July-September 1957, pages 216–226

During the period from 1940 to the present many Federal agencies have for the first time undertaken to conduct or sponsor research; others have greatly expanded already existing programs. Currently about 35 major departments and agencies have significant research activities. The greatest sources of impetus to research have, of course, been the two war emergencies with their demands for new and improved weapons and their applications of knowledge about nuclear fission to the problems of national defense. The expanding civilian economy and the advent of a service state philosophy on the American national scene have also been important contributors to the growth of Federal research. * * *

A series of studies, beginning with the National Resources Committee's Research—A National Resource—in 1938 and concluding with the report of the President's Scientific Research Board in 1947, recognized the need for policy guidance in order to assure that research would be effectively used in the national interest. Such agencies as the National Science Foundation, the interdepartmental Committee for Scientific Research and Development, and the Science Advisory Committee of the Office of Defense Mobilization came into being in order to provide the means of broad policy guidance which had been acknowledged as essential. * * *

[42] See pp. 17-20 for Mr. Honey's views on S. 3126.

The science policy agencies are the organizations or committees which, at the present time, have statutory or executive authority to provide broad policy direction to the Government's R & D effort. They include the quasi-governmental National Academy of Sciences-National Research Council, the National Science Foundation, the Interdepartmental Committee for Scientific Research and Development, and the Science Advisory Committee of the Office of Defense Mobilization. * * *

Five Federal agencies carry on substantial research programs of relevance to natural resources development and management. These include the Atomic Energy Commission, the Departments of the Interior, Agriculture, and Army, and the Tennessee Valley Authority. Several other agencies have smaller research programs in natural resources. Taken together these constitute the largest Federal nondefense research activity amounting to roughly $150 million annually.[42]

The natural-resource research programs deal with the peaceful applications of atomic energy, minerals, forestry resources, soil and water, and wildlife resources. The AEC is, of course, the principal repository of atomic-energy research. Its programs cover the development of civilian power reactors for the production of electric energy; advanced engineering and development work concerned with reactor materials and components, heat transfer systems, and advanced reactor prototypes; and physical-research programs in the several physical sciences.

Minerals-resources research programs are carried on principally by the Department of the Interior and the Tennessee Valley Authority. Interior's Geological Survey conducts basic field and laboratory investigations of mineral deposits, and does research on the development of geophysical and geochemical prospecting techniques. The Bureau of Mines, also in Interior, conducts field and laboratory investigations of underdeveloped mineralized areas, research in extractive metallurgy, in mining techniques, and in synthetic mineral products, among other activities. Both the Geological Survey and the Bureau of Mines do research on mineral fuels. The TVA conducts laboratory and pilot-plant-scale research to develop new fertilizers and processes for fertilizer manufacturing.

Forestry-resource research is conducted almost exclusively by Agriculture's Forest Service. Its work includes research on improved strains, better methods for the growing and harvesting of timber, control and prevention of forest fires, disease and pest control, and the utilization of forest products.

Several agencies conduct soil and water research. Major programs are found in the Geological Survey and the Army's Corps of Engineers. The former investigates the quality and quantity of ground and surface waters, and flood and sedimentation conditions. The latter does research and development in hydraulics, hydrology, soil mechanics, and construction materials. The Bureau of Reclamation in Interior is primarily concerned with the development of structures for flood control and irrigation. The saline-water program, also in Interior, seeks through research to find economical processes for the demineralization of saline waters. The Weather Bureau in Commerce conducts research on snowmelt, evaporation, and other hydrologic factors pertaining to water conservation and control. The TVA is concerned with research in hydrology and soil mechanics, and Agriculture's Soil Conservation Service cooperates with land-grant colleges in making soil surveys. * * *

Federal research into problems of human health is, from a dollar viewpoint, only modestly less significant than is research on natural-resource problems. The major health-research agencies are the Department of Health, Education, and Welfare, the Department of the Army, the Atomic Energy Commission, the Veterans' Administration, and the Department of Agriculture. Roughly, half of the health research which is supported by the Government is carried on under grants and contracts in educational and other nonprofit institutions. The major areas of medical research included in the Government's programs are internal medicine, including cancer, heart, neurological diseases, arthritis, and metabolic diseases; mental health; dental health; and resource utilization. Over three-fourths of the emphasis, in dollar terms, is devoted to internal and environmental medicine.

The National Institutes of Health and the Public Health Service (HEW) has principal responsibility for the internal-medicine research programs through its institutes concerned with cancer, heart ailments, neurological diseases and blindness, and arthritic and metabolic diseases. The Veterans' Administration has a more limited program of internal-medicine research.

[42] Since reference has previously been made to the prevailing organizational arrangements for research in the larger of the Federal research agencies, further discussion of organization is not presented here. For the interested reader additional data on Federal research organization may be found in Organization of the Federal Government for Scientific Activities, NSF 56-17, available at the Government Printing Office.

The Atomic Energy Commission conducts a broad program in biology and medicine which is classified, for purposes of this discussion, as environmental medicine. The objective is to minimize hazards associated with the use of radioactive materials and to protect against radiation. * * *

Numerous agencies, some not previously mentioned, carry on research programs of great importance to the national welfare. These programs, for the present purpose, may be categorized as ones dealing with agricultural resources, general research and scientific services, general transportation and communication, and business, finance, labor, public welfare, and education. The dollar volume of these many and varied research programs is infinitesimal as contrasted with expenditures for defense-related research. However, the full significance of such work cannot, of course, be appraised in dollar terms.

The Department of Agriculture, for example, conducts or supports, through grants and contracts, in the neighborhood of $100 million worth of agricultural research. The program covers, in addition to payments to States and Territories, research on crops, utilization of agricultural products, livestock, marketing and economic problems, and agricultural engineering problems.

In the general research and scientific services area are included the programs of the National Science Foundation; the Smithsonian Institution, with basic research in astrophysics, biology, anthropology, geology and archeology; and the National Bureau of Standards, which operates as a national physical laboratory. NBS programs encompass research in electricity, optics and meteorology, heat and power, electronics, radio propagation, and basic instrumentation, to mention but a few fields.

The research into general transportation and communication, as contrasted with the military, is supported by the Bureau of Public Roads in the Department of Commerce, in part through funds supplied to the States for highway research; by the Civil Aeronautics Administration, the Civil Aeronautics Board, and other agencies; and by the Maritime Administration (ship-structures research), the Post Office Department (postal equipment and vehicles research), and the Federal Communications Commission (radio propagation research).

In the business, finance, labor, public welfare, and education fields, numerous small research programs are conducted by the Departments of Labor and Health, Education, and Welfare, the Civil Service Commission, the Federal Trade Commission, the Council of Economic Advisers, as well as other agencies. These programs entail economic research which, for the most part, is carried out within the Government's own facilities.

While it is beyond the scope of this paper to discuss in detail major problems of Federal organization for research, one interesting issue may be briefly mentioned.

Reference has been made to the science-policy agencies of the Government, and note has been taken of the modest roles played by the National Science Foundation, the National Academy of Sciences and National Research Council, and the Interdepartmental Committee for Scientific Research and Development. Considerable evidence is in hand to suggest that stronger policy leadership would make a substantial contribution to the public interest, to the work of the scientific community, and to the efficient management of the Government's scientific programs. Strengthened leadership could come about in a number of ways, as, for example, through moving the policy responsibilities of the National Science Foundation to the Executive Office of the President, or through creating in the Executive Office a Council of Science Advisers somewhat akin to the Council of Economic Advisers. * * *

NEW YORK TIMES MAGAZINE

If We Are To Catch Up in Science. By John R. Dunning, November 10, 1957

* * * The entire world—except, perhaps, for America—is aware that the future belongs to the nation with the best technical brains. It is scientific weaponry, not masses of brave men, that will win wars. It is technology, not craftsmanship or knack, that makes economic power. We are losing a war we have not yet fought and strength we have not yet enjoyed. * * *

Responsible men are now generally agreed that conventional methods—the bait-and-boxtop method of encouraging students, the conference-and-cliché method of planning policies—are not adequate. What is needed immediately is a fundamental revision of our attitude toward scientists, our training of scientists, and our use of scientists. This is a prodigious task, but, as Toynbee has pointed out, it is not security that makes the greatness of a nation; it is challenge. * * *

We can profitably double the portion of our national income which we devote to education—which is no larger than the portion we devote to relaxations like tobacco. We can profitably double the portion of the national income we devote to basic research—research whose applications have not been decided on in advance. * * *

The emphasis on science and mathematics which we need so urgently for defense will be needed anyway, if we are ever to find replacements for our dwindling supplies of fuel and ore, or use our arts of automation to relieve our people of menial, repetitive labor. What is military technology today is a higher and more dignified standard of living tomorrow. * * *

We are losing a large number—Dean Charles C. Cole, Jr., in his college-board study, estimated 200,000 a year—of able students who do not go on to college from high school. Over 60,000 of these drop out for financial reasons.

But, if those able students did go on to college and engineering school, there would not be facilities to hold them all. Private universities are now getting Federal funds to enlarge and improve medical-school facilities. Similar funds, it is now felt, should be made available to engineering and scientific schools, which also have high laboratory costs.

Most of us would prefer to have such funds come from private sources, but the amount of private support, though growing, is only a tiny fraction of what is needed. The Government should set the pattern and respond to the most immediate need. One should not be excessively frightened of the word "subsidy." We subsidize our merchant marine and our airlines for defense reasons; we subsidize our farmers. * * *

Many scientists would now like to see a Secretary of Research and Development in the Cabinet, with a Federal coordinating agency of technological and managerial specialists—and a budget—behind him. * * *

The most crucial area for immediate improvement is in "lead time," the lag between an idea and its realization. It may take as long as 7 or even 9 years from the beginning of basic research for a project to move through its research, development, design, and production engineering stages into actual operation. This is too long. The Russians appear to work on a much tighter schedule, in some cases only one-half as long as ours. We need a major advance in management, throughout civilian industry as well as defense, by which these stages no longer will follow one another serially, but will overlap, each starting while others are still being worked on.

NEW YORK TIMES

Editorial: Science and Congress; February 28, 1958

Science and Congress

A congressional committee charged with looking into the Atomic Energy Commission's basic research program got itself lost in the intricacies of modern physics the other day. There was little, this newspaper's report indicates, that the Congressmen were able to get out of the testimony by several physicists on such matters as the nature of antiparticles and the forces that may give cosmic rays the enormous energy they possess—energy sometimes far exceeding the theoretically computed maximum.

Probably few, if any, ordinary citizens have followed the testimony better than the Congressmen did, but unlike ordinary citizens Congressmen have to participate directly in reaching decisions to which such testimony is pertinent. And this committee's experience is now not an isolated case. Government-financed research now covers many scientific fields, and there are complex scientific problems involved in making intelligent decisions about such major present programs as, for example, the conquest of space or the effort to achieve economic atomic power soon and economic controlled thermonuclear fusion power in the not too distant future.

Obviously we cannot expect each Congressman to be a mathematical physicist or a research chemist, but we have a right to expect that Congressmen voting on the appropriation of large sums for scientific research or for the large scale application of this research have enough basic background so they can understand testimony made before them and vote intelligently. It would seem wise if Congress itself, whose members must feel most keenly their deficiencies in this area, took steps to improve this situation, since the need for scientific sophistication in Congress is likely to increase rather than decrease in the years ahead.

APPENDIX B

SCIENTIFIC DEFINITIONS [46]

Scientific research and development.—For this report, "scientific research" is systematic and intensive study directed toward a fuller knowledge of the subject studied. "Development" is the systematic use of that knowledge directed toward the production of useful materials, devices, systems, methods, or processes, exclusive of design and production engineering. The term "scientific research and development" includes the actual conduct of research and development, and also all indirect, incidental, or related costs resulting from or necessary to the conduct of such research and development, regardless of whether the work is done by a governmental activity or by private individuals or organizations under a contractual arrangement with the Government. It excludes routine testing, mapping and surveys, collection of general-purpose statistics, experimental production, and activities concerned primarily with dissemination of scientific information or the training of scientific manpower.

The term also ineludes increase of research and development plant where funds are made available for physical facilities, such as land, buildings, or equipment, whether real or personal property, and where the primary intent is to enlarge the capital plant available for scientific research and development, regardless of whether the plant item is to be used by the Government or a private organization, and regardless of where title to the property may rest. The criterion of location provides the basis for distribution of obligations between Federal site or military installation and non-Federal site or institution.

Scientific fields.—The fields of work covered in this report include the life, physical, and social sciences which are further defined as follows:

Life sciences is the general term used to describe the biological, medical, and agricultural sciences. The "biological sciences" are those sciences dealing with life processes. The "medical sciences" are those sciences which, apart from the clinical aspects of professional medicine, are concerned primarily with the utilization of scientific principles in understanding diseases and in maintaining and improving health. The "agricultural sciences" are those sciences directed primarily toward understanding and improving agricultural productivity, such as agronomy, animal husbandry, forestry, horticulture, range management, soil culture, etc.

Physical sciences include the physical (proper), mathematical, and engineering sciences. "Physical sciences (proper)" are those concerned primarily with the understanding of the natural phenomena associated with nonliving things. "Mathematical sciences" are those sciences which employ logical reasoning with the aid of symbols and which are concerned with the development of methods of operations employing such symbols. "Engineering sciences" are those sciences which are concerned with studies directed toward making specific principles usable in engineering practice.

Social sciences are usually divided into several broad disciplines, each of which views human social behavior from a different angle. The commonly recognized fields are:

Anthropology, the science of man and his culture.

Economics, the science of man's behavior in obtaining goods and services in making a living.

Political science, the science of government.

Social psychology, the science of the functioning of the human individual in his social relationships.

Sociology, the science of society.

Social statistics, the science of quantitative method applied to the social phenomena.

The interdisciplinary sciences or the borderline sciences which are considered integral parts of biological and physical sciences, but have significant social science orientation. These include *demography*, the science of population; *physical anthropology*, the science of the races of man and their physical characteristics; *social geography*, the science of man's relation to his environment.

There are, as in the physical and biological sciences, many subdivisions and specialties within the main branches of the social sciences. There is also considerable overlapping among the social disciplines, as well as important overlapping between the social sciences and natural sciences.

[46] Source: Federal Funds for Science, NSF, 1957.

The history of the National Science Foundation's activities in the social sciences began with the introduction in Congress in 1945 of the Magnuson-Kilgore bill for the establishment of NSF. It was characterized from the outset by extensive debate on the part of Congressmen, Government officials, and the scientific community at large on the degree to which the social sciences, being concerned with human behavior, could observe and measure with the objective accuracy generally attributed to studies of man's environment. There was a major national controversy over the interrelations of the natural sciences and social sciences, including lengthy congressional hearings at which a most substantial majority of the witnesses supported the social sciences as essential to fulfillment of the NSF mandate—"to develop and encourage the pursuit of a national policy for the promotion of basic research and education in the sciences." The Cabinet members and other Federal officials who testified at all on this point supported unanimously and without reservation the principle of bringing the social sciences into the full picture. No witness expressed opposition in principle to Government support of the social sciences. A specific provision in the bill for establishment of a division of the social sciences within NSF was removed by the Senate, however, and when President Truman on May 10, 1950, signed the NSF Act, the law represented (insofar as research support, scholarships, and graduate fellowships were concerned) the "permissive but not mandatory" position put forth by Dr. Vannevar Bush, who originated the NSF concept at F. D. R.'s behest "to win the peace." [45]

Character of work.—In this report, the term covers research, basic research, and development, which are defined as follows:

Research is systematic, intensive study directed toward fuller scientific knowledge of the subject studied. This covers both basic research and applied research.

Basic research is that type of research which is directed toward increase of knowledge in science. It is research where the primary aim of the investigator is a fuller knowledge or understanding of the subject under study, rather than a practical application thereof.

Development is the systematic use of scientific knowledge directed toward the production of useful materials, devices, systems, methods, or process, exclusive of design and production engineering.

Performance component.—As used in this publication, "performance component" refers to the organizations conducting research and development for the Federal Government. Obligations are recorded on agency records for scientific research and development performed within the Federal Government, ordinarily referred to as intramural, or under contract or grant arrangement with organizations outside the Federal complex, commonly known as extramural research. These terms are further defined below.

Intramural research includes obligations required for work carried on by personnel directly employed by the agency or subdivision or any obligations carried on the books of the agency for work performed or planned for performance by any other Federal Government agency.

Extramural research includes obligations with non-Federal organizations, which are distinguished as follows:

Profit organizations are any orgnizations which may legally distribute net earnings to individuals or to another organization which may in turn distribute earnings to individuals. These organizations may be roughly equated to industrial organizations.

Educational institutions are any nonprofit organizations engaged primarily in providing resident instruction above the secondary school level (including medical schools), or which are affiliated with such organizations; e. g., as experiment stations, research institutes, and research bureaus.

Research centers may be described as research and development undertakings, exclusively or substantially financed by the Government, which in most instances were originally established to meet a research and development need of the Federal Government, and which are administered by a private organization through some kind of contractual arrangement. * * *

Nonprofit institutions are any private organizations other than educational institutions as defined above, no part of the net earnings of which inure to the benefit of any private stockholder or individual, and any other private organization for the exclusive purpose of turning over its entire net earnings to such an organization.[46]

[45] Harry Alpert, Program Director, NSF, Saturday Review, February 1 1958.
[46] Federal Funds for Science, NSF 1957.

PART II

SUPPORTING MATERIAL

To assist members of the Committee on Government Operations and the Special Committee on Astronautics and Outer Space Exploration in their consideration of S. 3126, and the proposed revision thereof, which would establish a Department of Science and Technology and standing committees on science and technology, to coordinate civilian scientific activities, the following material has been prepared under the direction of the staff:*

SECTION 1

A compilation of material relating to the creation of a Department of Science, by the Legislative Reference Service, Library of Congress.

SECTION 2

An historical summary of the activities of the National Academy of Sciences—National Research Council, with emphasis on science fellowship programs, prepared by the Legislative Reference Service, Library of Congress.

SECTION 3

Consists of (*a*) brief outlines of the various civilian scientific activities in certain foreign countries, including Belgium, Denmark, France, Canada, the Netherlands, Sweden, the United Kingdom, and Germany, prepared by Dr. Wallace R. Brode, president of the American Association for the Advancement of Science, and (*b*) a comprehensive analysis of the Department of Scientific and Industrial Research in the United Kingdom, with emphasis upon organization, the conduct of civilian scientific research, budgetary expenditures, related research activities, and allied scientific activities, compiled by the Legislative Reference Service of the Library of Congress.

SECTION 4

An analysis of legislation related to the improvement of scientific study, teaching, and progress in the United States, in the 79th Congress through the 1st session of the 85th Congress, showing bills introduced, committee action, and public laws enacted, compiled by the Legislative Reference Service of the Library of Congress.

*Tables of content precede each section.

SECTION 1

THE IDEA OF A NATIONAL DEPARTMENT OF SCIENCE

PREPARED AT THE REQUEST OF THE SENATE
COMMITTEE ON GOVERNMENT ORGANIZATION

BY
DOROTHY SCHAFFTER
SENIOR SPECIALIST IN AMERICAN GOVERNMENT
LEGISLATIVE REFERENCE SERVICE
LIBRARY OF CONGRESS

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THE IDEA OF A NATIONAL DEPARTMENT OF SCIENCE

Introduction

"We have no national policy for science. The Government has only begun to utilize science in the Nation's welfare. There is no body within the Government charged with formulating or executing national science policy. There are no standing committees of the Congress devoted to this important subject. Science has been in the wings. It should be brought to the center of the stage—for in it lies much of our hope for the future."

This paragraph, presented to a person in March 1958, might be attributed to any one of many scientists, Members of Congress, administrators in the executive branch of the Federal Government, or newspaper editorial writers who are today discussing the necessity for a stronger governmental program in scientific fields. The paragraph is, however, a quotation from Vannevar Bush's Science—the Endless Frontier, published in 1945 during a period in which there was, perhaps, as much concern about the relationships between Government and science as there is today.

Nor would it be difficult to go much farther back into our history in a search for similar expressions of opinion. At all times since the beginning of our National Government its relationships to science have been a matter of concern, and the extent of action in the effort to organize these relationships is indicated by the fact that one author has written a 460-page book dealing with the subject in the period before World War II (E. Hunter Dupree. Science in the Federal Government. A History of Policies and Activities to 1940, 1957). His chronology of events from 1787 to 1950 is 4 pages in length. But in spite of these important developments in the relationship between Government and science, Dr. Bush's statement is essentially true today. There is still no "national policy for science" and, although we have a National Science Foundation and a most extensive system of scientific activities in the Federal departments and agencies, there is no single responsible agency charged with formulating or executing national science policy.

A complete review of all past proposals for the establishment of such a Federal agency is, perhaps, not necessary. The student who wishes to go deeply into the problem has Dupree's book and the Bush report (both cited above) to which may be added Don K. Price's Government and Science, published in 1954.

Of the various proposals, the establishment of a Cabinet-level department is the one presently under consideration, and this report which contains background materials relevant to the proposal is useful in furnishing only selected materials rather specifically related to it. The materials chosen emphasize the post-World War II period, because this appears to constitute the "contemporary" period. Earlier proposals for a Federal department were made in different contexts and their present importance is not great from a purely practical stand-

point. In many cases the selected materials relate specifically to the proposed establishment of a Cabinet-level department of science. In other cases the selections contain discussions of the general theory that it is necessary to establish increased centralization of policy determination and administrative organization in Federal relationships to scientific research.

The report proper consists of a review of the contents of selected materials dealing with the events of the 1945–58 period.[1] These are subdivided into three groups as follows:

A. Before World War II (see appendix I).

This includes one brief summary statement.

B. After World War II (see appendixes II–III).

During the 1945–47 period many important hearings were held, and reports from congressional and executive groups were published. Although a Cabinet-level Department of Science was not frequently discussed, the problems under consideration were basic to this idea.

C. After the establishment of the National Science Foundation.

The result of the discussions dealt with in B, above was the establishment of the National Science Foundation. This was not a final solution and discussion soon began again. Several excellent descriptions of the existing Federal activities in scientific research and the organization established to administer them were published in 1956 and 1957.

The title of this report "The Idea of a National Department of Science" accurately describes its contents, although the report[1] itself by no means exhausts the subject. A series of appendixes (I–XVII) includes extended quotations from the sources described in the text, permitting more thorough study of the various proposals.

A. Before World War II

(See appendix I, p. 98)

In 1957, A. Hunter Dupree's Science in the Federal Government: A History of Policies and Activities to 1940 was published—a scholarly and detailed treatment of the subject which is particularly significant in the present (1958) consideration of proper governmental organization and function in the field of scientific research. The extracts quoted in appendix I summarize Dupree's thinking on "the first century and a half" and on "science in a democracy." He stated:

> A look backward over the Republic's first 150 years of experience with science shows a coherent pattern on two distinct levels. On the pragmatic plane of science responding to the needs of society, the story is one of accomplishment. On the higher plane of the attempt to create a comprehensive organization of science as a fundamental institution within the state, the record is fraught with yearning.

[1] Dr. Schaffter submitted, with the report, a total of 17 appendixes, which cited further additional and extensive extracts from the reports, articles, and publications cited herein. The appendixes, not incorporated in this report, have been made a part of the committee files.

The long series of experiments with central scientific organization "aimed to coordinate the Government establishment and at the same time to stand for science as an ideal and knowledge as an aspect of civilization," but no such organization "has successfully achieved a truly dominant position either in the country or in Government science." The reasons for this failure were discussed, and the author concluded that "the very efforts to solve the problem have, while failing to reach their goal, immeasurably enriched the scientific life of the Nation." The admirable relationships which have existed between science and Government in our democratic form of government led Dupree to conclude that "during a century and a half, science has not only contributed to the power of the Government but to the ability of the people to maintain their freedom."

B. After World War II

(See appendix II, p. 101)

The situation which existed before 1940 changed so rapidly in the following 5 years that increased interest was shown, both in the executive and the legislative branches of the Federal Government and in the scientific world, in the proper relationship between Government and scientific research. From the wealth of material on the subject published in the 1945–47 period, a few selections have been made which relate, directly or indirectly, to proposals for a single centralized administrative agency comprising all, or most of, the scientific functions of the Federal Government.

Early in 1945 the Subcommittee on War Mobilization of the Senate Committee on Military Affairs published a report entitled "The Government's Wartime Research and Development, 1940–44." This was based on replies from the departments and agencies to a questionnaire eliciting detailed information concerning their wartime activities in this field. Part II of the subcommittee's report contained their findings and recommendations, a brief quotation from which is contained in appendix II. Pointing out the temporary nature of the coordination between departments and agencies which had developed during the war, the subcommittee stated that "some mechanism for coordinating Federal research activities must be worked out before we can arrive at an intelligent use of Federal research resources," a necessity for "a balanced postwar program of Federal research." The report continued: "The scope of such coordination should be the whole range of Federal scientific activity. This in turn should be balanced with private activity through cooperative mechanisms and the advisory participation of leading scientists and administrators from private institutions."

In midsummer of 1945 powerful support for the subcommittee's recommendations came from Vannevar Bush, Director of the Office of Scientific Research and Development. His published report to the President—Science, the Endless Frontier—is today, 13 years later, outstandingly important because of its profound analysis of the place of science in our contemporary democratic form of government. To select any particular portions for quotation is difficult and the entire

report should be given careful consideration. Specifically, discussing relations between science and government, Dr. Bush wrote:

> We have no national policy for science. The Government has only begun to utilize science in the Nation's welfare. There is no body within the Government charged with formulating or executing a national science policy. There are no standing committees of the Congress devoted to this important subject. Science has been in the wings. It should be brought to the center of the stage—for in it lies much of our hope for the future.

In chapter 6, The Means to the End, Dr. Bush made specific suggestions for the mechanism within the Government necessary to carry out its appropriate scientific functions. He recommended establishment by Congress of a new independent agency "devoted to the support of scientific research and advanced scientific education alone." He continued:

> Industry learned many years ago that basic research cannot often be fruitfully conducted as an adjunct to or a subdivision of an operating agency or department. Operating agencies have immediate operating goals and are under constant pressure to produce in a tangible way, for that is the test of their value. None of these conditions is favorable to basic research. * * * Basic scientific research should not, therefore, be placed under an operating agency whose paramount concern is anything other than research. Research will always suffer when put in competition with operations. The decision that there should be a new and independent agency was reached by each of the committees advising in these matters.
>
> I am convinced that these new functions should be centered in one agency. Science is fundamentally a unitary thing. The number of independent agencies should be kept to a minimum. * * * Separation of the sciences in tight compartments, as would occur if more than one agency were involved, would retard and not advance scientific knowledge as a whole.

The five fundamentals which Dr. Bush considered as basic to an effective Government program included (1) stability of support to permit undertaking long-range programs; (2) appointment to the agency of persons with particular qualifications for the work; (3) promotion by the agency of research through contracts outside the Federal Government, since the agency should not operate its own laboratories; (4) maintenance of control over research by the institutions themselves and not by the Government agency; and (5) responsibility of the new agency to the President and Congress. Dr Bush wrote:

> Only through such responsibility can we maintain the proper relationship between science and other aspects of a democratic system.

One section of the report dealt with military research in its relationship to the proposed new civilian agency. As a permanent measure, in Dr. Bush's opinion,

> it would be appropriate to add to the agency needed to perform the other functions recommended in this report the responsibilities for civilian-initiated and civilian-controlled military research. The function of such a civilian group would be primarily to conduct long-range scientific research on military problems—leaving to the services research on the improvement of existing weapons.

Specifically, Dr. Bush recommended the creation of a national research foundation which—

> should develop and promote a national policy for scientific research and scientific education, should support basic research in nonprofit organizations, should develop scientific talent in American youth by means of scholarships and fellowships, and should by contract and otherwise support long-range research on military matters.

The subcommittee of the Senate Committee on Military Affairs, held extensive hearings in October and November 1945 during consideration of bills providing for Federal support of scientific research. Little consideration was given in these hearings to the establishment of a Cabinet-level Department of Science, but the testimony of many witnesses, even though they were not discussing this type of agency, dealt with problems which would also be involved if it were to be created. In four cases there was a specific recommendation for a Cabinet-level Department of Science, and one witness expressed his disapproval of such a plan. The advocates were an unidentified "representative of industry" from Kentucky who had been interviewed; Dr. L. C. Dunn, chairman of the zoology department of Columbia University; Dr. Philip R. White, associate, Rockefeller Institute for Medical Research; and Robert C. Clothier, president, Rutgers University. George S. Avery, director, Brooklyn Botanical Gardens, went on record as opposed to an administrative officer of Cabinet rank.

Without attempting to summarize the excerpts which have been compiled for the use of the committee, attention is called to some of the major problems discussed in them which, in all probability, would also arise in consideration of the present (1958) proposal to establish a Federal Department of Science:

1. The fear of political control of the new agency, rather than control by scientifically competent officials.

2. The necessity for a single responsible Government agency to administer the expenditure of public funds in support of scientific research, in the public interest.

3. The transfer to the new agency of certain scientific functions now exercised in the several departments and agencies, and the retention in such departments and agencies of a part of these functions.

4. The alternative proposal of strengthening the National Academy of Sciences—National Research Council, rather than establishing a new agency.

5. The question of assigning to the new agency (*a*) purely civilian research, (*b*) civilian research on military projects, or (*c*) military research on military projects.

6. The degree of control or coordination or encouragement which the new agency should exercise in its relationship to the scientific work of the other departments and agencies.

7. The assignment to the new agency of basic research only, leaving all research programs of existing agencies, exclusive of basic research, under their exclusive control.

8. The possibility of having the new agency approve or disapprove the tentative research programs of other agencies, transferring funds to the latter to carry out approved programs.

9. The belief that fundamental scientific research is best conducted under private auspices, and that a new top-level governmental agency is undesirable.

10. The belief that the nature of science is unitary and, consequently, all scientific functions should be centralized in one agency, versus the belief that the field of science is so broad and so complex that it is best to have several different specialized agencies handling research in their respective fields.

11. Because science is as important a function as any now represented in the Cabinet, it needs the power and responsibility attaching to that rank: the Secretary of such a Department should be heard in the making of national policy as it occurs in the Cabinet.

After the hearings, described above, in October and November 1945 a summary of testimony was published in December 1945. In appendix III there is reproduced the introduction to this report, which contained a brief summary of the legislative history of the proposals for a new Federal scientific agency as of the end of the year 1945.

Also during December 1945 hearings were held before a subcommittee of the Senate Committee on Commerce, on proposals to establish an Office of Technical Services in the Department of Commerce. Although there is in this proposal a degree of relevance to the idea of a Federal Department of Science, much of the testimony was on details. The legislative representative of the American Federation of Labor testified in regard to the broader aspects of proper organization within the executive branch to handle scientific research functions. In particular, doubt was expressed as to the wisdom of placing an Office of Technical Services in any one major department, and objection was raised to establishing such an Office independent of the proposed National Research Foundation, currently under consideration by another committee of the Senate.

A few months later, Representative Clare Boothe Luce introduced a bill to create a Federal Department of Science and Research (H. R. 5332, 79th Cong.). No action was taken on the bill. Briefly, it provided for a Secretary to be appointed by the President with confirmation by the Senate, and five Assistant Secretaries, appointed by the President, acting respectively as heads of Bureaus of Physics and Mathematical Sciences, Public Health and Social Sciences, Scientific Education and Information, Biological Sciences, and Engineering and Technological Sciences. The Secretary was empowered to appoint an advisory council of not more than 100 members, representing all branches of science. Additional details were included in the bill.

As the conclusion to its work during 1945, the Senate Committee on Military Affairs published a final report, accompanied by a separate minority report, in the spring of 1946. The majority report (S. Rept. No. 1136, 79th Cong.) recommended the establishment of a "new coordinating science agency," the National Science Foundation, after discarding other methods of administering Federal assistance to scientific research. This decision resulted from their conclusion—

> that the greatest gains both to science and the Nation would result from strengthening the scientific programs in existent organizations, especially in institutions of higher learning which have traditionally been the chief sources of our basic scientific development. * * *
>
> The proposed Federal agency is unique in that it is to be not an operating organization but an instrument for expending public funds primarily in non-Government agencies.

After reviewing briefly the history of earlier attempts at better coordination of the Government's scientific activity, the majority report stated:

> An intelligent use of the Federal expenditures for research can only be accomplished by bringing into being some definite mechanism which hitherto has not existed. At the outset, it must be recognized that coordination of science cannot be accomplished by decree or fiat, but by a mutual understanding and exchange of problems, men, facilities, and findings. The scope of such coordination must be the whole range of scientific activity in the Federal Government. * * * The new bill provides for the needed mechanism under the aegis of the Foundation without disturbing the administrative autonomy or budgetary arrangements of existing agencies. It creates a central switchboard by which the scientific agencies of the Government can coordinate their efforts with one another into an intelligent, overall scientific program. Where exchange of information and a mutual discussion does reveal the need for modifications in administrative action, these can be achieved on the part of the agencies involved or through use of mechanisms for such purpose, namely, the Office of the President, and, particularly, the Bureau of the Budget.

The majority report recommended establishment in the new agency of an Interdepartmental Committee on Science as a "distinct improvement over the present ad hoc arrangements without hindering the independence or initiative of the various Federal research organizations."

The minority stated (S. Rept. No. 1136, pt. 2, 79th Cong.):

> We do not concur in the recommendation that this particular bill be favorably considered. We do not oppose Federal financial aid to those engaged in scientific research but we do oppose Government control and direction of research in the fields of science. Such control will, we believe, stultify progress in research rather than aid it.

The minority was particularly critical of the powers to be granted to the Administrator of the new agency which would make him "one

of the most powerful men in the Government and in the country." They further opposed adding another large agency to the Government structure, and placing "another sector of our national economy" under "the centralization, control, and supervision of Washington." This would bring another field of State responsibility—education and learning—under "the domination of the Federal Government." Another "huge expenditure" would be added to our "already dangerously unbalanced budget."

In May 1947, the Senate Committee on Expenditures in the Executive Departments held hearings on the proposed Technical Information and Services Act. Dr. Jesse E. Hobson, of the Armour Research Foundation, discussed the proposed National Science Foundation, pointing out several disadvantages which he believed would result from Federal supervision of science. Except in the fields of research included in public health, national security, development of natural resources, agriculture, military affairs, and maintenance of scientific and industrial standards, Dr. Hobson believed that the Federal Government should not exercise control, but should merely stimulate and encourage research, supplementing private sources and funds with public funds and supervision only when necessary. He advocated giving consideration to—

> placing the problem of support for basic scientific research in the hands of industry, as well as stimulating industry to give much greater support to scientific education. * * * I feel that applied research should be left entirely in the hands of industry, with stimulation provided by the Federal and State Governments, through amendment of the tax laws.

Dr. Hobson disapproved provisions of the proposed Technical Information and Services Act which gave to the Department of Commerce sponsorship of industrial research, fearing that it would put the Government into competition with private industry, but he approved the plan for a technical survey of scientific and industrial fields, and the collection and dissemination of available technical information. Dr. Hobson stated that—

> Financial assistance for the research programs of entire industries and trade associations should be given only when the industry or association has itself made a sizable contribution and further only when the Government of the United States acquires no rights or interests under patents which may result from the research program.

On October 17, 1946 President Truman appointed John R. Steelman Chairman of the President's Scientific Research Board, assigning to him the preparation of a report on the Nation's position in scientific research and development, with recommendations as to suitable action by the Federal Government. This five-part report, under the general title "Science and Public Policy" was published in the autumn of 1947. More than 10 years later the report is still of great value, even through its purely factual portions are out of date and some of its recommendations (particularly for the establishment of a National Science Foundation) have been adopted. Attention is called to a few significant excerpts from volume 1, A Program for the Nation and volume 3 Administration for Research.[2]

[2] Lengthy excerpts from this report have been submitted to the committee.

The Steelman report stated that it was probable—

> that provision should be made for the location of the National Science Foundation within any new Department of Health, Education, and Security which may be set up in the future. While a degree of independence is desirable in the administration of funds for basic research, all permanent programs in support of higher education should ultimately be grouped together for administrative purposes and to permit their closer integration.

Investigation of the scientific work of the Federal Government as it is carried out "in or through hundreds of installations under 41 bureaus operating within most major agencies" of the Government had revealed 2 conditions: (1) in nonmilitary research and development "virtually no duplication of effort" was found, and the problem was "not elimination of overlapping work, but synthesis of the entire effort" in a manner to make the program as a whole most effective; and (2) on the other hand, there were found "acute problems of overlapping work in the Military Establishment."

An excellent section on authority to conduct research and development dealt with the constitutional and statutory basis for this function, and the principal areas of Federal interest. Two proposals for revision of statutes were made: (1) one dealt with support of basic research through grants rather than contracts, with the provision that "every Federal agency with major research responsibilities should have authority to make grants for basic research, the entire program, * * * to be coordinated by the National Science Foundation"; and (2) the second proposal was that funds obligated for support of basic research outside the Federal Government should remain available for expenditure for 5 years.

In the discussion of Federal organization for science as it provides for policy determination, the report made significant statements in the present connection. In determining policy three interrelated problems must be solved: (1) an overall picture of the allocation of research functions among the Federal agencies, and of the relative emphasis placed on fields of research and development within the Federal Government must be available; (2) a central point of liaison among the major research agencies must be provided; and (3) there must be "a single point close to the President at which the most significant problems created in the research and development program of the Nation as a whole can be brought into top policy discussions."

The report contained this conclusion:

> Setting up an organization to handle these diverse functions is not a simple task that can be solved, for example, by establishment of a Department of Science. Such an approach was considered in the course of these studies and, after consultation with scientists and administrators, was rejected.

The report continued with explanation of the proper functions of the proposed Interdepartmental Committee for Scientific Research, the Bureau of the Budget, and Presidential liaison through a designated member of the White House staff.

In an excellent discussion of policy and program formulation, the means of developing a unified policy for science were described. The inadequacies of the existing organization were pointed out, and the

proper standards for the organization of Federal scientific research administration were stated. These standards included (1) fully adequate mechanisms and methods by which public policy for science is made, (2) correct allocation of functions to the various departments and agencies, and (3) a systematic approach to liaison.

The report included the following recommendations designed to produce an administrative organization which met the stated standards:

1. An Interdepartmental Committee on Scientific Research and Development should be established by Executive order.
2. The Bureau of the Budget should set up a unit for reviewing Federal scientific research and development programs.
3. A member of the White House staff should be designated by the President for purposes of scientific liaison.
4. A National Science Foundation on sound lines should be established.

In connection with the proposed National Science Foundation, the report stated:

> It should be located within the Executive Office of the President until such time as other Federal programs in support of higher education are established. At such time, consideration should be given to grouping all such activities—including the National Science Foundation—in a single agency.

C. After the Establishment of the National Science Foundation (1950–57)

The long discussion of an appropriate organization to handle the scientific research functions of the Federal Government was ended for the time being by the establishment of the National Science Foundation in 1950, but the scope and complexity of the problem increased at such a rapid rate that discussion began again within a few years.

E. R. Piore, deputy chief and chief scientist in the Office of Naval Research, stated the basic problem to be met by the Government in its conduct and support of research in terms of two aspects. The Government's underlying motivation is the utilization of science to acquire practical results, but a strong motive is also the desire to support science as one of the great human endeavors in man's quest for truth. The scientific work in Government agencies differs widely because of different motivations which, in turn, produce different programs and mechanisms. The author stated:

> However, there is a pattern and one can foresee the future trends. These trends are disconcerting. In order to fully appreciate the pattern and the disconcerting trends, let us make a historical approach.

He divided the period from the signing of the Constitution to the present into three overlapping periods: (1) 1800–90, during which our energy was devoted to conquest of the frontier; (2) 1850–1920, during which the drive for indistrialization occurred; and (3) 1920–50, during which superindustrialization and capital export abroad were dominant—a period which he described as "one of Government support of science with a vengeance."

His discussion of the third period—the contemporary scene—is of particular interest. He wrote, in part:

> To date, each Federal agency has had a free hand; its program was always designed to meet its operational needs. The breadth and depth of the individual program were determined by those administering the individual program, obviously with congressional approval since Congress provides the funds.
>
> However, there is a deep concern that the $2 billion is being expended without proper planning and coordination, although most of the money is for development which requires a high degree of coordination. [Several examples illustrate this point.]
>
> The drive for supercoordination, for a national policy, is here. This involves scientific research quite apart from development. There are congressional pressures, there are administrative pressures. [An example illustrates this point.]
>
> We have come to a point in our history where there is a real possibility that for neater administration, with the goal of saving money and at the same time getting more science, the Federal expenditure will be superplanned within a frame of so-called national policy. With the large equity that the Federal Government has in science, this could dominate our scientific life and we may lose sight of the "fearless quest for truth" which has been the basis of our scientific progress and strength.

If a single source were to be selected to serve as background reading for persons interested in the current problems of Government scientific research, probably the best selection would be Don K. Price's Government and Science: Their Dynamic Relation in American Democracy. Attention is called to his discussion of the question, "To what extent should the National Science Foundation be used by the President and his Executive Office to coordinate in any aggressive way the scientific programs of the executive branch?" Price offered arguments in support of the need for a strong central agency to coordinate the research programs of the different agencies, to keep a proper balance between basic and applied research in those programs, and to help the President and Congress in appraising the general policies of the Government with respect to science. He saw no need "to put all science into a single agency; on the contrary," he wrote, "we need to see that it is infused into the program of every department and every bureau."

The proposal to establish a Cabinet-level Department of Science raises certain questions of public administration which must be considered. The basic principles governing the decision as to whether the departmental form of organization is suitable for this particular function are stated and explained in Leonard D. White's Introduction to the Study of Public Administration, 1955. He stated that a department is based on some broad substantive purpose, and is concerned with the provision of services for people, or with regulating their conduct in particular fields. The departments are called the "line" agencies. "Auxiliary" agencies do not serve the public, but perform services for the "line" agencies—as, for example, the General

Services Administration. "Staff" agencies act as advisory bodies, without operating responsibilities. Both "auxiliary" and "staff" agencies exist to facilitate the work of the "line" departments.

In the present connection, the question is whether scientific research is a substantive function of the Federal Government, or whether it is auxiliary in nature—a means directed toward achieving a substantive function. White's discussion bears directly on the question but furnishes no direct answer.

In considering the establishment of a Cabinet-level Department of Science it is necessary to have an up-to-date description of the scientific-research activities of the Federal Government. The National Science Foundation published in 1956 a 349-page report entitled "Organization of the Federal Government for Scientific Activities," from which the following portions relating to certain characteristics of the development of these activities are cited: (1) Many agencies broadened the scope of their scientific work; (2) civilian agencies assumed scientific functions which had originated in the military departments; (3) major wars spurred the creation of new governmental or quasi-governmental agencies to aid in military research; (4) the number and variety of Government laboratories multiplied; (5) the Government concentrated its efforts primarily on applied research; and (6) surveys were made of the Nation's research effort. The report itself consisted of a most detailed description of the organization of scientific activities in the different departments and agencies.[3]

In 1957 the National Science Foundation published a 27-page report entitled "Advisory and Coordinating Mechanisms for Federal Research and Development, 1956–57." The introduction to the report explains the purpose and states that—"A very extensive network of mechanisms" exists, and the description in the report of these coordinating devices would be useful in indicating relationships between functions now carried out in two or more operating agencies, which should be borne in mind in determining their disposition in the new department.

For the general reader, the two reports of the National Science Foundation described above are, perhaps, too long and detailed. An excellent short article by John C. Honey, describing the Federal organization and programs for research, appeared in a recent issue of the Federal Bar Journal.[4] The rapid expansion of Federal support for research was described, and certain recent trends were noted. The major organizations and their programs were described under the headings of science-policy agencies, the defense-research agencies, the natural-resource research agencies, the health-resource research agencies, and other research programs. The author's concluding discussion of a major problem of Federal scientific-research organization related to the modest roles played by the science-policy agencies. He wrote:

> Considerable evidence is in hand to suggest that stronger policy leadership would make a substantial contribution to the public interest, to the work of the scientific community, and to the efficient management of the Government's

[3] See Appendix A of pt. I of this report, p. 72.
[4] See Appendix A of pt. I of this report, p. 75, for extracts from this article.

scientific programs. Strengthened leadership could come about in a number of ways, as, for example, through moving the policy responsibilities of the National Science Foundation to the Executive Office of the President, or through creating in the Executive Office a Council of Science Advisers somewhat akin to the Council of Economic Advisers.

He concluded by asking six questions which, in his judgment, needed to be dealt with more fully than at present. One of these related to the appropriate distribution of Federal research effort among the various functional areas of governmental responsibility.

In late November and early December 1957, the establishment of a Federal Department of Science was advocated editorially by the Christian Science Monitor and the Memphis Commercial Appeal and other newspapers. On January 5, 1958, Senator Estes Kefauver, Senator Karl Mundt, Representative Kenneth B. Keating, and Represenative Carl Albert appeared on the CBS television network in a discussion of the work of the 85th Congress. Although there was only brief consideration of the proposed new Department, the four Members expressed general approval of it.

On January 27, 1958, Senator Hubert H. Humphrey, on behalf of himself and Senator John L. McClellan and Senator Ralph Yarborough, introduced a bill entitled "The Science and Technology Act of 1958." His remarks, the text of a memorandum prepared by the staff of the Senate Committee on Government Operations, which analyzed the provisions of the bill, the text of a statement by Senator Yarborough, and texts of three earlier bills dealing with Federal aid to students are fully covered in part I of this report. Senator Chapman Revercomb expressed doubt concerning certain provisions of the bill, although he considered that its introduction was timely.

Appendix I

A. Hunter Dupree. Science in the Federal Government: A History of Policies and Activities to 1940. Cambridge, Belknap Press of Harvard University, 1957; 460 pages; at pages 375–381.

The First Century and a Half

A look backward over the Republic's first 150 years of experience with science shows a coherent pattern on 2 distinct levels. On the pragmatic plane of science responding to the needs of society, the story is one of accomplishment. On the higher plane of the attempt to create a comprehensive organization of science as a fundamental institution within the State, the record is fraught with yearning.

From the beginning, the Government proved able and willing to use the science of the day not only for its own internal needs but as a boon to its citizens. The Lewis and Clark Expedition and the coast survey were early examples of what became, after 1830, the systematic use of science in all phases of exploration, both of the westward reaches of the continent and of the sealanes that carried American commerce around the world. During the Civil War, glimpses of other uses of science widened its scope, and in the two generations following 1865 a great scientific establishment arose within the Government, developing its own typical organization around the problems it faced, recruiting a specialized personnel, and contributing greatly to the scientific resources of the country. With World War I, the establishment had to shift into the field of weapons research on a wide scale for the first time. By the 1920's and 1930's, science was so important a part of society that Government science not only became thoroughly interlaced with the other research institutions of the country but received major shocks from the social and economic upheaval of the great depression.

The history of the pragmatic response of Government science is not without its shadows. Some of its agencies failed to survive; for instance, the National Board of Health. Indifference and occasional outright hostility made the way

harder in Congress. To reconcile the actualities of civil service with the needs of science was difficult, both before and after the introduction of the merit system. As the other estates of science arose—research in the universities, in the foundations, and in industry—the Government often suffered by comparison. Because the public interest seemed to demand a practical use assured in advance for all its work, it sometimes had to endure the scorn of those with a discriminating taste for pure knowledge.

Over the long sweep of a century and a half, however, the shadows are only minor. When the needs cried out, science answered with measurable results. Many of the Nation's most illustrious names appear on the roll of those who responded. Many of the more obscure ones brought science to the Government in spite of personal sacrifice and inadequate reward. Some of the institutions they built were among the greatest of their kind in the world. The practice of whole industries, the knowledge of whole branches of science, and the well-being of the entire population of the country would be markedly impaired without the cumulative results of Government science. And, since the results of science during most of the 150 years flowed freely over national boundaries, the Government's contributions entered the general reserve of knowledge available for the use of all the world. Whatever the United States borrowed from European sources impoverished no one, while what she put back enriched both the practice and the knowledge of others.

No generation has been satisfied that pragmatic response to needs was the whole of the relation between the Government and science. In the first place, the necessity always appeared of arranging the piecemeal responses of science into a coherent pattern. In the second place, the conviction persisted that the Government had a responsibility for science independent of its practical usefulness. This duty emphasized the basic discoveries that made science an integral part of civilization.

The welding of these two basic attitudes produced a long series of experiments with central scientific organization. No period in the history of the Republic is altogether devoid of specific proposals to meet this combined aspiration. The American Philosophical Society, the American Academy of Arts and Sciences, and a national university were the candidates in the first era. Then the National Institute, the Smithsonian Institution, and finally, the National Academy of Sciences arose from a generation of lively debate after 1830. A Department of Science in the executive branch of the Government loomed briefly in the 1880's. The National Research Council emerged from World War I. The peculiar character of the decade of the 1920's was reflected in the national research fund. The Science Advisory Board and the Science Committee of the National Resources Committee were products of the depression and the New Deal. The OSRD was the crowning effort of World War II. With all their variation in approach, support, and membership, these organizations aimed to coordinate the Government Establishment and, at the same time, to stand for science as an ideal and knowledge as an aspect of civilization.

Along the way, other more specialized institutions edged into the stream of central scientific organization. The Coast Survey dominated the pre-Civil War era. The Geological Survey had immense influence in the 1880's. The Forest Service grew up in the progressive era to stand for the whole conservation point of view. The Carnegie Institution of Washington was the private foundations' effort to make the Capital City a true scientific metropolis. In the 1940's weapons research under the Armed Forces seemed to many to become the whole of Government science, basic as well as applied. In the long run, however, these agencies were only seasonal mushrooms, depending on special circumstances and often on unusually gifted individual administrators. The names of Bache, Powell, and Pinchot come first to mind. The increasing scarcity of the phenomenon after 1900 indicates that only cataclysmic events such as World War II could give a specialized group any color of a central organization.

None of the candidates for the position has successfully achieved a truly dominant position either in the country or in Government science. All have sooner or later missed their mark. In the course of this history of frustration some general phenomena have emerged. In the first place, an institution that had to depend on endowment had too little elasticity to fill the role, witness the Smithsonian's experience during and after the Civil War. In the second place, the public functions inherent in the role made its fulfillment impossible for a purely private institution. The National Institute, the Smithsonian, the National Academy, and the National Research Council never surmounted the difficulty that arose when they asked Congress to turn over public money. Could Congress give over control to a private body, even one made up of experts or one in which

Congressmen as individuals sat? That this question never received a clear-cut affirmative is evident in the Smithsonian's inability to keep the NACA and in the lack of Federal support of the National Academy, the peacetime NRC, and the Science Advisory Board.

In the third place, the executive branch of the Government never saw its way clear to yielding its right to reject the advice of an outside body. The National Academy never gained the right to name scientists for appointment or to limit the President's selection to a panel named by them. By the Executive orders creating the National Research Council, the Science Advisory Board, and the OSRD, the President asserted his general authority in the field. Thus, a channel of responsibility between the organization and the Federal Executive emerges as a requirement for success.

Finally, an institution had to have not only a legal authority within the Government, but a moral authority with all the estates of science in the country and a position of honor among the great scientific societies of the world. This broader dimension was a concern of the earliest organizations as well as the later ones. But in the 20th century, Government research became so collossal that by its use of funds and personnel it could control the dynamics of the other estates of science. With this dominant position, the approbation of all science became an absolute necessity. To be truly representative of the varied interests of the professional natural scientists, engineers, and social scientists who demand a voice, implies a certain amount of independence in the face of the Government's interests. The need for reconciliation of the Government's legitimate demand for responsibility and the scientists' essential stake in independence is one way of stating the unsolved dilemma of all attempts at central scientific organization.

The failure of these many groups to become a central organization does not mean that they strove entirely in vain. Although they did not successfully solve the basic problem, most of them not only survived but made illustrious records in which their friends and members take justifiable pride. The Smithsonian has entered its second century still holding to the ideal of pure research and the universality of its scope that Joseph Henry set for it. The National Academy still had a role to fill as an administrative framework for certain types of advice even when the age of nuclear fission dawned. The National Research Council has proved highly useful to both the OSRD and the National Science Foundation, even though they were its successors as central organizations. Hence the very efforts to solve the problem have, while failing to reach their goal, immeasurably enriched the scientific life of the Nation.

Science in a Democracy

From the beginning of the Republic, men had two attitudes toward science. On the one hand, seeing its freedom and the withering of superstitution and blind authority under its examination, they concluded that it was cut of the same pattern as democracy. On the other hand, observing the inaccessibility of its lore to the untutored masses and the support it traditionally received from aristocratic sources, they feared that inconstant democracy could never have the discrimination to foster science on the same plane with authoritarian states. In the 20th century, this second mistrustful attitude took two forms. One fear saw dictatorships using science with horribly efficient purpose to destroy a free world that had the research but could not mobilize it. The other fear saw science itself becoming so powerful and so complex that the people could not understand it and their representative institutions could not control it. Against these extremes stands the long experience of American democracy.

In a narrowly partisan sense, science has seldom been a political issue. No party has ever been consistently proscience and the other antiscience. From the day of Thomas Jefferson and John Adams to that of Herbert Hoover and Franklin D. Roosevelt, a friendliness to science has been common ground for those who differed on other issues and whose parties professed to stand at opposite poles. The turning points in policy have seldom coincided with changes in party control of the Government. The scientists themselves have held every shade of opinion. Some ages have condemned them as dangerous radicals; others have mistrusted them as standpatters.

In a broader way, however, politics has been a factor in Government science from the time the Constitutional Convention puzzled about the powers of the Federal Government over internal improvements. The shift of political center of gravity in the Union that accompanied the Civil War was necessary to the opening of new possibilities. In the progressive era, the power to gather data and the power to regulate moved close together. Beginning with the First World

War, science became a recognized part of the military—the most direct power available to the state. By the 1930's research was recognized as a national resource; during World War II it proved its right to the title.

The Congress as the representatives of the people and the controller of the purse had to come to a working relation with science from the time of its first session when patent applications began to arrive. On occasion it tried to administer science directly through its own committees, as in the case of the Wilkes expedition collections. But by the Civil War it had retired from this pretension. Throughout most of the 19th century, Congress was a major check on the growth of Government science. Only by such techniques as the organic act buried in an appropriation bill was the Federal establishment built. However, in the 20th century, the Congress, in spite of misgivings about its role in providing for research, has ceased to be a negatively limiting factor on the use of science in the Government. Given adequate preparation and presentation of programs, Congress has shown itself able and willing to support research. As popular indifference to science has given way to admiration for its more spectacular accomplishments, Congress has reflected the change in its attitude toward such activities as public health.

The executive control of science was in the first years centered largely in the President himself. Jefferson had marked interest in science, but his whole civil service scarcely contained another to equal him. After sifting down through the Cabinet, effective control of science reached the level of the bureau chief during the Civil War, notably in Alexander Dallas Bache, Charles Henry Davis, and Joseph Henry. As the establishment grew, the bureau chief became more firmly entrenched, although after the Powell period the incumbents seemed a little less like statesmen. During the early 20th century the effective administration of research remained low in the pyamid of authority, even though Gifford Pinchot momentarily carried conservation issues into the upper reaches of Theodore Roosevelt's administration, only to metamorphose himself into a politician. By the time of the great depression, science began to press decisions on higher officials, pushing up to the President for the crucial choices concerning the manufacturing of an atomic bomb. Although the macninery of advice by which decisions are made in higher echelons is a major problem, the executive has a firm base for control and an extensive body of experience on the lower level.

How the Government can keep science in bounds is only one side of the relation. The controlling structure itself is the product of an experience profoundly affected by science. Democracy as measured by 20th century practice in the United States has had the benefit of a long partnership with science, not a long record of hostility. The conservationists of the progressive era profoundly believed that only a government informed by science could rule justly in the public interest. If their belief was too simple, the experience of the Nation has nevertheless been in their favor. A democracy that has in fact enjoyed the results of science has been more tolerable, more humane, and more able to fulfill its responsibilities to its people. After the industry of the country and the military forces of the world came to draw their power from research technology, a government without considerable scientific competence could not have governed at all. During a century and a half, science has not only contributed to the power of the Government but to the ability of the people to maintain their freedom (pp. 375–381).

Appendix II

The Government's Wartime Research and Development, 1940–44. Report from the Subcommittee on War Mobilization to the Committee on Military Affairs, United States Senate, 79th Congress, 1st session. Part I—Survey of Government Agencies, Senate Subcommittee Report No. 5, January 23, 1945; 326 pages; Part II—Findings and Recommendations, subcommittee print, July 1945; 14 pages. At pages 10–11 of part II. (The survey procedure used by the subcommittee is described at pp. 1–6 of pt. I; the remainder of the report includes the reports from each agency (pp. 7–276) and financial data (pp. 277–326)).

Long before this war, and even before World War I, the need for better coordination of the Government's scientific activities was recognized.

To the existing twoscore scientific agencies of the Federal Government, another half dozen were added to meet wartime needs. Some coordination of their work was achieved by an elaborate system of formal committees, in addition to numerous close and informal contacts on a personal basis between the Nation's scientists. Such coordination as now exists is of a temporary character and will end with the coming of peace. Some mechanism for coordinating Federal research activities

must be worked out before we can arrive at an intelligent use of Federal research resources. This is necessary to a balanced postwar program of Federal research.

The chief function of coordination should be (1) to insure that the most important problems are receiving adequate attention; (2) to make possible the best matching of such problems with scientific workers and facilities; (3) to make significant findings available to all interested investigators as rapidly as possible.

Such coordination will arise from a mutual exchange of information on problems, men, facilities, and findings. It cannot be accomplished by decree but by mutual understanding. Where exchange of information and mutual discussion does reveal the need for definite action to achieve more efficient coordination of activity, final responsibility to assure that necessary action is taken should rest with a central scientific agency or with an overall supervisory agency such as the Bureau of the Budget.

The scope of such coordination should be the whole range of Federal scientific activity. This in turn should be balanced with private activity through cooperative mechanisms and the advisory participation of leading scientists and administrators from private institutions.

APPENDIX III

Science Legislation: Analytical Summary of Testimony. Appendix to report from the Subcommittee on War Mobilization to the Committee on Military Affairs, United States Senate, 79th Congress, 1st session. Senate Subcommittee Monograph No. 5, December 1945. 138 pages. At pages v–vi.

On January 23, 1945, the Subcommittee on War Mobilization issued part I of its report, the Government's Wartime Research and Development, 1940–44, which presented the results of the subcommittee survey of the work of some 40 Federal agencies and bureaus engaged in or concerned with research activities.

On July 23, 1945, the subcommittee issued part II of the report, which summarized the subcommittee's findings and recommendations in regard to the Government's wartime program in the light of prewar scientific development and anticipated postwar problems.

On the same day, July 23, 1945, I introduced into the Senate, for myself and Senator Johnson of Colorado and Senator Pepper of Florida, S. 1297, a bill to establish a National Science Foundation as an independent agency of the Federal Government. S. 1297 was referred to the Senate Committee on Military Affairs and further to the Subcommittee on War Mobilization.

A similar proposal originated in the executive branch of the Government. On July 5, 1945, Vannevar Bush, Director of the Office of Scientific Research and Development, made a report to the President, entitled "Science—the Endless Frontier," in which the creation of a permanent overall Federal agency for the support of science was recommended.

The recommendations of this report were incorporated in S. 1285, which was introduced into the Senate on July 19, 1945, by Senator Magnuson, of Washington. S. 1285 was referred to the Senate Committee on Commerce and further to a subcommittee headed by Senator Magnuson.

A bill, S. 1248, to establish a Bureau of Scientific Research within the Department of Commerce, was introduced into the Senate on July 9, 1945. S. 1248 was referred to the Senate Committee on Commerce and further to a subcommittee headed by Senator Pepper, of Florida.

Because of the related character of these three bills, I invited Senator Magnuson and Senator Pepper and their subcommittees to participate in joint hearings before the Subcommittee on War Mobilization of the Senate Committee on Military Affairs. Senator Fulbright, sponsor of S. 1248, was also invited to participate in the hearings.

Joint hearings were opened on October 8, 1945, and continued until November 2, 1945. On the first day of hearings, Senator Magnuson and myself joined in a draft of a proposed bill as a further basis of discussion in the hearings.

Approximately 100 witnesses appeared during the month of hearings, and over 1,000 printed pages of testimony was taken. The witnesses included both scientists and other experts and representatives of interested groups and Government agencies. Included were witnesses invited to appear by Senator Magnuson and myself, and witnesses who appeared at their own request.

These witnesses were virtually unanimous on the need for a National Foundation for the Promotion of Science.

Some differences of opinion were expressed by the witnesses which reflected the differences in the original bills, S. 1297 and S. 1285. Other differences of opinion

were expressed in regard to matters which were raised during the hearings but were not covered in the original bills. Most important of these was the inclusion of the social sciences within the proposed Foundation and the question of international cooperation which was dealt with in the committee print of October 8.

A number of other new questions were raised during the course of the testimony. Among these were the proposal for a separate Division for the Biological Sciences, the right of private publication of information, and the use of an automatic formula for the distribution of funds for research among the several States.

The staff of the Subcommittee on War Mobilization has prepared an analytical summary of the more than 1,000 pages of testimony. This summary, which will be printed shortly, excludes the question of atomic energy, which was touched upon during the hearings but which is being considered by a special committee of the Senate, and excludes the testimony in regard to S. 1248, on which subsequent and fuller hearings will be held.

A tabular summary covering selected issues concerning which there was the greatest amount of discussion is attached. It is necessarily imperfect in that it gives equal weight to the testimony of each witness, which varied from a simple expression of opinion on one hand to a forceful and comprehensive analysis on the other. This tabulation includes only opinions explicitly stated by the witnesses in their testimony.

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SECTION 2

THE NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL

Historical Summary of Activities, With Particular Emphasis on the Administration of Fellowship Programs

PREPARED FOR THE
SENATE COMMITTEE ON GOVERNMENT OPERATIONS

BY
DOROTHY M. BATES
ANALYST IN AMERICAN GOVERNMENT
SENIOR SPECIALISTS DIVISION
LEGISLATIVE REFERENCE SERVICE
LIBRARY OF CONGRESS

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THE NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL

"The National Academy of Sciences is a private nonprofit corporation dedicated to the furtherance of science for the general welfare and required by its congressional charter to act as an official adviser on scientific matters to the Federal Government." [1]

Establishment and Early History of the Academy

Although the National Academy of Sciences was not established until 1863, there is evidence that the idea of such an institution had been in the minds of many of the early statesmen. Washington, Franklin, Jefferson, and Adams all expressed genuine interest in the progress of science, and actively favored the establishment of institutions for the diffusion of knowledge.[2]

Throughout the first half of the 19th century, the need for a national scientific academy continued to be felt. This need was voiced in 1851 by Alexander Dallas Bache, president of the American Association for the Advancement of Science:

> * * * I would throw out for your consideration some reasons which induce me to believe that an institution of science, supplementary to existing ones, is much needed in our country, to guide public action in reference to scientific matters. * * *
>
> * * * * * * *
>
> Our country is making such rapid progress in material improvements, that it is impossible for either the legislative or executive departments of our Government to avoid incidentally, if not directly, being involved in the decision of such questions. Without specification, it is easy to see that there are few applications of science which do not bear on the interests of commerce and navigation, naval or military concerns, the customs, the lighthouses, the public lands, post offices or post roads, either directly or remotely. If all examination is refused, the good is confounded with the bad, and the Government may lose a most important advantage. If a decision is left to influence, or to imperfect knowledge, the worst consequences follow.
>
> Such a body would supply a place not occupied by existing institutions, and which our own is, from its temporary and voluntary character, not able to supply.[3]

[1] National Research Council of the National Academy of Sciences. Organization and members 1954–55. Washington, D. C., December 1954. 115 p. at p. 1.

[2] The scientific interests of these men are discussed in The Origin of the National Scientific and Educational Institutions of the United States, by G. Brown Goode, Annual report of the American Historical Association for the year 1889. Washington, Government Printing Office, 1890. pp. 53–161.

[3] Proceedings of the American Association for the Advancement of Science, 6th meeting, 1851 (1852) pp. xlvii–li, as quoted by Frederick W. True, A History of the First Half Century of the National Academy of Sciences, 1863–1913, at pp. 7–8. Washington, 1913, 399 pages.

Authorities differ in their versions of the circumstances by which the Academy was established,[4] but they are agreed on the individuals to whom credit is due for formulating the essential lines of the organization. These were a small group of men informally organized as the "Scientific Lazzaroni" primarily from Washington and Cambridge. Among them were Alexander Dallas Bache, Superintendent of the Coast Survey; Benjamin Gould, also of the Coast Survey; Joseph Henry, Secretary of the Smithsonian Institution; Admiral Charles Henry Davis, Chief of the Bureau of Navigation of the Navy Department; Benjamin Peirce, Louis Agassiz, and Wolcott Gibbs of Harvard University, and James Dwight Dana of Yale.

It has been suggested that the secession of the South ended a deadlock of years in the Congress and opened the way for the enactment of legislation whose passage had previously been blocked.[5] Late in January 1863, Davis, Bache, and Henry met to discuss the renewed possibility of getting through a "national association under an act of Congress." Confronted with the specific matter, Henry now offered numerous objections concerning the feasibility of attempting such action at that time, and his arguments seemed to convince Davis and Bache. As a substitute measure, the creation of a Permanent Commission, patterned after the British "Select Commissions" was suggested, approved, and presented to the Navy Department. On February 11, 1863, the Secretary of the Navy issued an order creating a Permanent Commission "consisting of, for the present, Commodore Davis, Professor Henry, and Professor Bache, to which shall be referred questions of science and art upon which the Department may require information." [6] The Commission was to have authority to call in associates to aid in their investigations and inquiries, but neither members nor associates were to receive compensation for their services.[7]

Meanwhile, Admiral Davis and Professor Bache continued to favor the idea of asking Congress to incorporate an academy, in the name of leading scientific men throughout the country. The arrival in Washington of Louis Agassiz, who had been nominated by Senator Henry Wilson of Massachusetts as a regent of the Smithsonian Institution, furnished the motivation needed to make the academy a reality. Discussion took place between Professor Bache, Admiral Davis, Professor Peirce, Dr. B. A. Gould, and Senator Wilson, and it was decided that the Senator should introduce into Congress a bill of incorporation. On February 21, 1863, Mr. Wilson introduced S. 555, to incorporate the National Academy of Sciences. Action on the bill was rushed through and completed on March 3, 1863, the closing day of a lame duck session. The bill in its original form was passed by the Senate and then the House and was signed by President Lincoln, all in the same day.

The act of incorporation of the National Academy of Sciences listed the names of those who would constitute the academy, and limited membership to not more than 50 ordinary members. The corpora-

[4] See: True, A History of the First Half Century of the National Academy of Sciences, op. cit. ch. I, The Founding of the Academy, pp. 1-23; also, Dupree, The Founding of the National Academy of Sciences—A Reinterpretation, Proceedings of the American Philosophical Society, vol. 101, October 31, 1957, pp. 434-440.

[5] Dupree, op. cit., p. 435.

[6] Text of letter of appointment, from True, op. cit., pp. 1-2.

[7] According to Dupree, op. cit., p. 435, the Commission "met frequently, examining proposals for new weapons and occasionally making some tests. The last report, in 1865, was numbered 257. This was the nearest thing to a central war scientific agency achieved during the Civil War."

tion was granted broad powers of organization. Section 3 set forth the duties:

> That the National Academy of Sciences shall hold an annual meeting at such place in the United States as may be designated, and the Academy shall, whenever called upon by any department of the Government, investigate, examine, experiment, and report upon any subject of science or art, the actual expense of such investigations, examinations, experiments, and reports to be paid from appropriations which may be made for the purpose, but the Academy shall receive no compensation whatever for any services to the Government of the United States.

Changes were made in the original act on July 14, 1870, to "remove the limitation of the number of ordinary members of said Academy as provided in said act." Acts of June 29, 1884, and May 27, 1914, made minor changes in the Academy's powers relating to trust funds.

The founders of the Academy appeared to have two objectives in mind when they drew up the plan of establishment. The Academy was to afford recognition to individuals who had made significant contributions in their fields of science. This was in line with the similar practice being followed by scientific academies abroad. The second objective of the Academy was to act as the scientific adviser of the Government, for at this time research organizations such as the National Bureau of Standards, the Geologic Survey, or the Weather Bureau were not in existence.

Of the Academy's role as Government adviser during the Civil War, it has been stated:

> Bache (the Academy's first president) did not delay his attempt to establish the Academy as the Government's adviser. On his own authority he set up committees and had them ready to report at the meeting in Washington in January 1864. Taken together, the committees make it clear that Bache and Davis personally inspired all the requests that came to the Academy in 1863. The total results were modest enough, and when the committees unrelated to the war effort are ruled out the remainder of service is negligible. The four committees of 1864, while not emanating directly from Bache and Davis, made no better record. No wartime committees date later than May 2, 1864, when Grant was just beginning his campaign with the Army of the Potomac and nearly a year of fighting lay ahead. When compared with the 257 reports made by the Permanent Commission, the advice rendered by the National Academy appears slight.[8]

In the first half century of the Academy's existence, 53 committees to study a wide range of subjects were appointed in accordance with acts of Congress, at the request of joint commissions and committees of Congress, at the request of the President, and of the major Government departments.[9] Some of the Academy's recommendations were of considerable importance to the future of research activity within the Government. The Forest Service and the preservation policy for our national forests, the Geological Survey which unifies

[8] Dupree, op. cit., pp. 437–438.
[9] True, op. cit., ch. IV, The Academy as the Scientific Adviser of the Government, pp. 201–331. Photostats of pp. 203–205 attached.

and develops the survey work of the Department of Interior, the establishment of the Weather Bureau and the National Bureau of Standards—all were proposed and urged in Academy studies during its first 50 years.

There are indications, however, that the use of the Academy's facilities by Government departments during the early period was not as extensive as some individuals thought was desirable. An editorial from the Scientific American concerning this relationship concluded:

> It is a startling anomaly that the Government, having had about the best "gray matter" in the country at its unlimited disposal for more than half a century, has made very little use of it.[10]

And on this subject also, George Ellery Hale, a member of the Academy, wrote:

> * * * Valuable suggestions for cooperation with various departments of the Government have been made by Academy members, and every effort should be exerted to carry them into effect. But recent experience indicates that the most promising way to accomplish this lies in first developing the standing and prestige of the Academy. When it becomes more widely and favorably known for its contributions to scientific progress, and is universally recognized as the national and authoritative representative of American science, the Academy's influence with Congress and with the various officers of the Government will be far more potent than at present.[11]

Committees Appointed by the Academy on Behalf of the Government (1863–1913) [12]

1. Committees appointed in accordance with acts of Congress.
   - 1871. On the Transit of Venus (p. 256).
   - 1872. On Preparing Instructions for the *Polaris* Expedition (p. 40).
   - 1878. On a Plan for Surveying and Mapping the Territories of the United States (p. 268).
   - 1879. On a National Board of Health (p. 50).
   - 1894. To Prescribe and Publish Specifications for the Practical Application of the Definitions of the Ampere and Volt (p. 313).
   - 1908. On the Methods and Expenses of Conducting Scientific Work Under the Government (p. 330).
2. Committees appointed at the request of Joint Commissions and Committees of Congress.
   - 1884. On the Signal Service of the Army, the Geological Survey, the Coast and Geodetic Survey, and the Hydrographic Office of the Navy Department (p. 295).
   - 1902. On the Establishment of a National Forest Reserve in the Southern Appalachians (p. 323).

[10] Editorial, National Academy of Sciences and the National Government, Scientific American, August 28, 1915, p. 176.
[11] National academies and the progress of research, II. Science, vol. 41, January 1, 1915: 12-23. At p. 22
[12] A History of the First Half-Century of the National Academy of Sciences 1863-1913. Washington 1913. 399 p. Prepared and edited by Frederick W. True.

3. Committees appointed at the request of the President of the United States.
   1870. On the Protection of Coal Mines from Explosion by Means of Electricity (p. 253).
   1902. On Scientific Explorations in the Philippines (p. 325).
4. Committees appointed at the request of the Treasury Department.
   1863. On the National Currency (confidential).
   1863. On Weights, Measures, and Coinage (p. 206).
   1863. On Saxton's Alcoholometer (p. 218).
   1864. On Materials for the Manufacture of Cent Coins (p. 227).
   1866. On the Prevention of Counterfeiting (p. 331).
   1866. On Spirit Meters (p. 239).
   1866. On Proving and Gauging Distilled Spirits and Preventing Fraud (p. 239).
   1866. On Metric Standards for the States (p. 211).
   1870. On the Effect of Chemicals on Internal Revenue Stamps (p. 254).
   1873. On an International Bureau of Weights and Measures (p. 212).
   1875. On Waterproofing the Fractional Currency (p. 261).
   1875. On Means of Distinguishing Calf's Hair from Woolen Goods (confidential).
   1876. On Artificial Coloring of Sugars to Simulate a Lower Grade According to the Standard on which Duties are Levied (confidential).
   1876. On the Use of Polarized Light to Determine the Values of Sugars (p. 264).
   1877. On Demerara Sugars (p. 264).
   1878. On Building Stone To Be Used for the Custom House at Chicago. (No report.)
   1882. On the Separation of Methyl Alcohol, or Wood Spirits, from Ethyl Alcohol (p. 291).
   1882. On Glucose (p. 293).
   1882. On Triangulation Connecting the Atlantic and Pacific Coasts. (No report.)
   1884. On Philosophical and Scientific Apparatus (p. 302).
   1885. On the Tariff Classification of Wools (p. 306).
   1886 and 1887. On the Morphine Content of Opium (p. 309).
   1887. On Quartz Plates used in Saccharimeters for Sugar Determinations (p. 308).
   1890. To Formulate a Plan for a Systematic Search for the North Magnetic Pole (p. 311).
5. Committees appointed at the request of the Navy Department.
   1863. On Protecting the Bottoms of Iron Vessels (p. 213).
   1863. On Magnetic Deviation in Iron Ships (p. 215).
   1863. On Wind and Current Charts and Sailing Directions (p. 219).
   1864. On the Explosion on the United States Steamer *Chenango* (p. 230).
   1864. On Experiments on the Expansion of Steam (p. 226).
   1877. On Proposed Changes in the American Ephemeris (p. 267).
   1881. On the Transit of Venus (p. 256).
   1885. On the Astronomical Day, the Solar Eclipse of 1886, and the Erection of a New Naval Observatory (p. 303).

6. Committees appointed at the request of the War Department.
   1864. On the Question of Tests for the Purity of Whiskey (p. 225).
   1866. On the Preservation of Paint on Army Knapsacks. (No report.)
   1867. On Galvanic Action from Association of Zinc and Iron (p. 232).
   1873. On the Exploration of the Yellowstone. (No report.)
   1881. On Questions of Meteorological Science and Its Applications (p. 290).
7. Committees appointed at the request of the Department of State.
   1866. On the Improvement of Greytown Harbor, Nicaragua (p. 247).
   1903. On the Restoration of the Declaration of Independence (p. 279).
8. Committees appointed at the request of the Department of Agriculture.
   1870. On Silk Culture in the United States (p. 331).
   1881. On Sorghum Sugar (p. 284).
9. Committees appointed at the request of the Department of the Interior.
   1880. On the Restoration of the Declaration of Independence (p. 279).
   1896. On the Inauguration of a Rational Forest Policy for the Forested Lands of the United States (p. 314).

Establishment of the National Research Council

With the approach of the First World War, members of the Academy sought means by which they could assist in the emergency. On April 19, 1916, at the closing session of the annual meeting, the Academy voted unanimously to offer its services to the President of the United States in the interest of national preparedness.[13]

On April 26 a delegation from the Academy was received by the President of the United States. In presenting the resolution adopted at the annual meeting, it was suggested that the Academy might advantageously organize the scientific resources of educational and research institutions in the interest of national security and welfare. The President accepted this offer, and requested the Academy to proceed at once to carry it into effect. An organizing committee was formed and after a survey of the situation recommended:

> That there be formed a National Research Council, whose purpose shall be to bring into cooperation existing governmental, educational, industrial, and other research organizations with the object of encouraging the investigation of natural phenomena, the increased use of scientific research in the development of American industries, the employment of scientific methods in strengthening the national defense, and such other applications of science as will promote the national security and welfare.

[13] Details concerning the initial steps in the organization of the National Research Council are taken from a preliminary report of the organizing committee to the president of the Academy, by George E. Hale, chairman, from Proceedings of the National Academy of Sciences, August 1916, vol. 2, pp. 507–510.

The committee recommended further:

> That the Council be composed of leading American investigators and engineers, representing the Army, Navy, Smithsonian Institution, and various scientific Bureaus of the Government; educational institutions and research endowments; and the research divisions of industrial and manufacturing establishments.

By the creation of this auxiliary body, a means was found whereby the services of men who had the most to contribute to the preparedness effort could be used, regardless of whether or not they were eminent enough to merit election to the Academy.

That the Council succeeded in its objectives was confirmed by the commendation contained in an Executive order of May 11, 1918 in which the President requested the Academy to perpetuate the Council, and enumerated its duties:

> The work accomplished by the Council in organizing research and in securing cooperation of military and civilian agencies in the solution of military problems demonstrates its capacity for larger service. The National Academy of Sciences is therefore requested to perpetuate the National Research Council the duties of which shall be as follows:
>
> 1. In general, to stimulate research in the mathematical, physical and biological sciences, and in the application of these sciences to engineering, agriculture, medicine and other useful arts, with the object of increasing knowledge, of strengthening the national defense, and of contributing in other ways to the public welfare.
>
> 2. To survey the larger possibilities of science, to formulate comprehensive projects of research, and to develop effective means of utilizing the scientific and technical resources of the country for dealing with these projects of research, and to develop effective means of utilizing the scientific and technical resources of the country for dealing with these projects.
>
> 3. To promote cooperation in research, at home and abroad in order to secure concentration of effort, minimize duplication, and stimulate progress; but in all cooperative undertakings to give encouragement to individual initiative, as fundamentally important to the advancement of science.
>
> 4. To serve as a means of bringing American and foreign investigators into active cooperation with the scientific and technical services of the War and Navy Departments and with those of the civil branches of the Government.
>
> 5. To direct the attention of scientific and technical investigators to the present importance of military and industrial problems in connection with the war, and to aid in the solution of these problems by organizing specific researches.
>
> 6. To gather and collate scientific and technical information, at home and abroad, in cooperation with governmental and other agencies, and to render such information available to duly accredited persons.
>
> Effective prosecution of the Council's work requires the cordial collaboration of the scientific and technical branches of the Government, both military and civil. To this end

representatives of the Government, upon the nomination of the National Academy of Sciences, will be designated by the President as members of the Council, as heretofore, and the heads of the department immediately concerned will continue to cooperate in every way that may be required.

The Academy and the Council Since World War I

During the next quarter of a century, both the Academy and the Research Council were devoted almost exclusively to civilian purposes. The coming of the Second World War again brought about fundamental changes in the functions of both the Academy and the Council. The following excerpts from an Academy report summarize developments during the war years—1939–47:

> Practically the entire 8-year interval was covered by activities concerned with preparation for war; the war years; and the early postwar period. While many of the normal functions of both the Academy and Council continued, they were subordinate to the functions imposed by the Academy's act of incorporation which constitutes it as the official adviser to Government in matters of science and technology. During most of the time few papers of a scientific or technical character were available or, if available, could be presented.
>
> To a large extent the Academy ceased to function as a learned society in the traditional sense. While the regular two meetings a year were held, they were devoted mainly to the dispatch of routine business. Such scientific sessions as were possible were closed to the public and were confined to the presentation of confidential reports to the members on war research. In part these were reports by members and in part by high-ranking officers of the military establishments.
>
> * * * * *
>
> The first impact of war preparedness on the Academy and Research Council came in the form of urgent requests from various branches of the Military Establishment—notably the offices of the Surgeons General—for aid in organizing civilian science for war research and development work in fields recognized as certain to be of major importance to the military. * * *
>
> For a time it appeared that the Academy, although willing and anxious to undertake the work, might not be able to comply with the requests.
>
> * * * * *
>
> While * * * the Academy was willing to undertake the work and the requesting departments were willing to pay the cost of it, the Academy, under the ruling of the Comptroller General, was required to supply the working capital. As the Academy had no such funds at its disposal nor, because of its character, the ability to make commercial loans, it appeared for a time that it would have to default on its statutory obligation.
>
> Fortunately a number of the foundations took the position that the Academy could not in the national interest be

permitted to be placed in this position. As a result, during the years 1939–41 they made grants of many hundred thousand dollars to the Academy and so enabled it to comply with all requests.

When, therefore, the military and civilian departments of Government were finally implemented properly, much of the preliminary work was already done; further work adequately organized; and much valuable time saved.

* * * * *

Two of the most important but least known war services of the Academy were those concerned with the development of the atomic bomb and defense against possible biological warfare, both top-secret matters.

At the outset of considerations of atomic fission as a possible effective weapon, the Academy was formally requested to examine and report on the matter; also as to the probable time elements involved in a successful solution if one appeared possible. A select committee of the most distinguished scientists was appointed, and on the authority of its report all the great undertaking which led finally to Hiroshima and Nagasaki was based. * * *

In the case of defense against possible biological warfare, the request to the Academy for advice came in a personal secret letter from the Secretary of War. Again a select committee of the most distinguished scientists * * * was appointed to review and report. The findings of this committee after the most exhaustive and critical study of biological warfare in all its possible aspects ever undertaken was so conclusive that the War Department immediately organized secret research and development work on a huge scale. As a part of this undertaking, the Secretary of War insisted that the Academy continue to exercise top supervision of the entire undertaking. * * *

* * * * *

In quite another but equally important sector the Council played a dominant role. Through its committee on the Quartermaster's Department it operated throughout the war as the top research and development agency for that vast sector of the Army. * * *

* * * * *

Two other outgrowths of the Academy's war activity of major importance might be mentioned; viz, the request to it to give top scientific advice to the occupation forces in Japan on the plans to reorganize the scientific and technical structure of that country along peaceful lines and the request that the Academy set up and operate a continuing survey of the aftereffects on the survivors of the atomic bombing of Hiroshima and Nagasaki.

* * * * *

The sending of the mission was made possible through the generosity of the Rockefeller Foundation.

The second request was made to the Academy directly by the President of the United States and is supported finan-

cially by funds appropriated by the Atomic Energy Commission. * * *

While the main activities of the Academy and Council * * * have been concerned with war matters, they have not been to the complete exclusion of new long-range activities in civil science. Among these new things might be mentioned the fact (1) that the NRC has undertaken to act as the research agency of the Cancer Society in the administration of some millions of dollars annually in this sector of medicine; (2) that at the request of the United States Chamber of Commerce it has undertaken to do comprehensive building research with funds provided by the chamber from industry; (3) that at the request of a number of societies in the field of biology it has undertaken to set up an Institute of Biology; and (4) that it has constituted a Committee on Agriculture in response to urgent requests for scientific leadership in that field.[14]

Annual reports of the Academy and the Council for subsequent years contain reports of continued activity of the two organs both in private and in governmental research. During the fiscal year 1951–52 (the last year for which a published annual report is available)[15] the Government provided $3,928,000 for activities of the Academy while more than $1,221,000 was received from private foundations, individuals and corporations. The following table is a classification of income of the Academy and Research Council by source and of expenses by purpose for the year ended June 30, 1952:[16]

Classification of income by source for year ended June 30, 1952

Source	Amount	Percent
U. S. Government, under contracts for specifically requested services	$3,457,313.46	62
Foundations, industrial concerns, and other private sources for studies, projects and other restricted purposes	1,411,478.90	25
Interest and dividends on general funds investments, dues of members, sales of publications, and other sources for general purposes	708,480.41	13
Total	5,577,272.77	100

Classification of expenses by purpose for year ended June 30, 1952

Purpose	Amount	Percent
Performance of work required by contracts with the U. S. Government	$3,555,989.71	65
Studies, projects, and other services pursuant to private grants and other arrangements exclusive of work for the U. S. Government	1,225,279.71	22
General administration, including operation and maintenance of the physical plant	685,832.81	13
Total	5,467,102.23	100

It may be helpful at this point to include the following excerpt from the report of the Academy for the year 1950–51 in which the

[14] Report of the National Academy of Sciences, fiscal year 1946–47. Washington: U. S. Government Printing Office, 1948, 192 pp. At p. 1–5.

[15] Reports of the National Academy of Sciences-National Research Council for the fiscal years ended June 30, 1953, and June 30, 1954, were submitted to the Congress and referred to the Senate Committee on Rules and Administration on May 10, 1956. As of December 1957 these reports were not available for public distribution in published form.

[16] Report of the Treasurer for the fiscal year ended June 30, 1952, in Report of the National Academy of Sciences-National Research Council, fiscal year 1951–52, at p. 94.

Academy-Research Council relationship was clarified and redefined by Academy President Detlev W. Bronk:

> There has long been lack of understanding of the relations between the National Academy of Sciences and the National Research Council; there has been no clear definition of their relative functions and objectives. There have been times when these ill-defined relations have fostered friction and dissent. Constitutionally these relations are well defined: the Research Council is a constituent agency of the Academy; the Research Council enlists the talents of many who are not members of the Academy. The Academy formed the Research Council as a council of representatives of various specialized scientific societies in order to achieve a synthesis of fragmented scientific effort and knowledge necessary to the wholesome development of science and its uses. Accordingly, it is meaningless to say that the National Research Council is an active, effective agency whereas the Academy does little but elect new members. I repeat, the Research Council is a part of the Academy, and the officers and Council of the Academy are responsible for the conduct of all the affairs of the Academy including those carried out under the aegis of committees of divisions of the Research Council.

The Administration of Fellowship Programs by the Academy-Research Council

One of the most important activities of the National Research Council directed toward the furtherance of research is the fellowship program. Originating in 1919, with the establishment of postdoctoral fellowship programs in physics, chemistry, and mathematics financed by grants from the Rockefeller Foundation, the Council's activities in the administration of fellowships have increased sharply, particularly in the period since the Second World War. The following programs are now being administered by the Academy-Research Council:

National Research Council natural sciences fellowships
Medical fellowships
Merck fellowships in the natural sciences
RCA fellowships in electronics
Fulbright scholarship program
National Science Foundation fellowships
Lilly fellowships in the natural sciences

The fellowship programs are in general under the direction of groups organized by the Office of Scientific Personnel of the Research Council who are assisted by the eight science divisions, viz, anthropology and psychology; biology and agriculture; chemistry and chemical technology; earth sciences; engineering and industrial research; mathematics; medical sciences and physical sciences.

Brief surveys of the major fellowship programs being administered by the Academy-Research Council are included below. A description of the fellowship program of the Atomic Energy Commission is included although it is no longer administered by the Academy-Research Council.

NATIONAL RESEARCH COUNCIL NATURAL SCIENCE FELLOWSHIPS

This program of postdoctoral fellowships was established in 1919 through grants from the Rockefeller Foundation. The initial grants were confined to three fields: physics, chemistry, and mathematics. Other fields have been added from time to time. The purpose of the fellowships is to promote fundamental research in science primarily in educational and research institutions of the United States. They are awarded to persons who have demonstrated research ability, to enable them to obtain additional experience in research at institutions which make adequate provision for effective prosecution of research. Approximately 1,600 scientists have been aided by these grants. In recent years about 15 fellowships have been awarded annually. Out of 138 applications for work during the academic year 1952–53, 13 postdoctoral fellowships were awarded (4 in biology, 3 in chemistry, 1 in geology, 2 in mathematics, and 3 in physics.)

MEDICAL FELLOWSHIPS

Fellowships in the medical sciences were first awarded in 1922, also from grants from the Rockefeller Foundation. Other organizations which are supporting or have supported medical fellowships through the Medical Fellowship Board under the Council's Division of Medical Sciences are the Lilly Research Laboratories; the National Tuberculosis Association and the National Foundation for Infantile Paralysis. Nineteen fellowships were awarded for work in the academic year 1952–53; 17 were for research in general medicine and 2 for study of problems of tuberculosis. Fellowships averaged about $4,000.

MERCK FELLOWSHIPS IN THE NATURAL SCIENCES

This program of postdoctoral fellowships was established in 1947 under grants from Merck & Co., Inc. The initial grant was $100,000 plus administrative funds for a 3-year period beginning July 1, 1947. The program seeks through advanced education, training, and development to enable individuals in the physical, chemical, or biological sciences to broaden their investigational activity by acquiring familiarity with another area.[17] Between 5 and 10 fellowships have been awarded annually.

RCA FELLOWSHIPS IN ELECTRONICS

The RCA fellowships in electronics were established in 1947 with financial support from the Radio Corporation of America. This is the only program of fellowships at the predoctoral level which is directly administered by the National Research Council. The fellowships seek to provide special graduate training and experience to young men and women who have demonstrated marked ability in the general field of electronics. From 5 to 10 awards have been made annually.

[17] National Research Council of the National Academy of Sciences: Organization and Members, 1955–56, op. cit., p. 15.

LILLY FELLOWSHIPS IN THE NATURAL SCIENCES

These postdoctoral fellowships were established in 1952 under a grant from the Lilly Research Laboratories. Their purpose is to provide further education, training, and development to young men and women who have shown marked ability for research in the natural sciences. Fields included are biochemistry, biophysics, botany, organic chemistry, physics, physiology, zoology, and allied fields. Five fellowships were awarded for work in 1952–53.

NATIONAL SCIENCE FOUNDATION FELLOWSHIPS

The fellowship activities of the National Research Council were greatly expanded during the fiscal year 1952 when the Council accepted responsibility for the screening of applications for the fellowship program of the National Science Foundation, both at the predoctoral and the postdoctoral levels.

To handle this task, the Council appointed 7 panels, comprising 42 scientists, to make a preliminary review of the applications, and to make the final selections, 6 committees were set up for the predoctoral group and 1 for the postdoctoral group. For this program alone, 63 leading scientists of the United States served without compensation, except for expenses, on panels and committees, in order to insure selection of the best possible candidates for the award of these fellowships.[18]

The reason for the selection of the National Research Council to perform the screening of applicants was stated in the Fourth Annual Report of the National Science Foundation, for the year ending June 30, 1954 (pp. 52–53).

> In setting up the screening and selection procedures for its fellowship program, the Foundation drew heavily upon the experience of other groups whose programs have operated successfully for several decades. The excellence of the selection methods used by the National Research Council and the Rockefeller Foundation, for example, has been shown by followup studies of the later scientific careers of successful applicants.

Between 3,000 and 3,500 applications for fellowships have been reviewed annually by the screening panels of the Council. The evaluation of each predoctoral candidate is compiled from his three-part record: (1) test scores on verbal ability, quantitative ability, and scientific aptitude in his chosen field; (2) previous scholastic record; and (3) confidential evaluation reports of faculty advisers. An attempt to include in the National Science Foundation Act of 1950 a stipulation that no scholarship shall be awarded by the Foundation unless the individual applying has been investigated by the FBI and found to be loyal, and in addition, that he has never belonged to any organization on the subversive list of the Attorney General, was defeated, after protests from educator and scientific groups, including a unanimous statement by the Council of the National Academy of Sciences to the President of the United States. The section concerning loyalty as a prerequisite to acceptance of a scholarship or fellowship

[18] Report of the National Academy of Sciences 1951–52. At p. 43.

which was embodied in the National Science Foundation Act of 1950 is as follows:

> No part of any funds appropriated or otherwise made available for expenditure by the Foundation under authority of this chapter shall be used to make payments under any scholarship or fellowship to any individual unless such individual (1) has executed and filed with the Foundation an affidavit that he does not believe in, and is not a member of and does not support any organization that believes in or teaches, the overthrow of the United States Government by force or violence or by any illegal or unconstitutional methods, and (2) has taken and subscribed to an oath or affirmation in the following form: "I do solemnly swear (or affirm) that I will bear true faith and allegiance to the United States of America and will support and defend the Constitution and laws of the United States against all its enemies, foreign and domestic." The provisions of section 1001 of title 18 shall be applicable with respect to such affidavits.

After the Council's National Science Foundation Predoctoral Fellowship Screening Panels and the Postdoctoral Fellowship Evaluation Board have made their preliminary evaluations, Final Predoctoral and Postdoctoral Fellowship Evaluation Boards make the final selection of candidates which are recommended to the National Science Foundation for awards. The National Science Foundation makes the final selection of candidates to which fellowship awards are made. The extent of the fellowship program sponsored by the National Science Foundation, from the beginning of the program to date, is shown in the table below:

Academic year	Total number of applications	Predoctoral awards	Postdoctoral awards	Senior postdoctoral awards	Amount expended by NSF
1952–53	2,963	560	55		$1,532,971
1953–54	3,298	515	42		1,366,344
1954–55	3,326	657	79		1,865,978
1955–56	3,389	715	70		1,783,706
1956–57	3,559	775	80	40	2,131,026

The objective of the National Science Foundation fellowship program is to provide means for advanced training of talented individuals who have chosen science as a career. Awards are made at three levels: Predoctoral, postdoctoral, and senior postdoctoral, with the predoctoral fellowship program being given the maximum emphasis. Each year approximately a third of the predoctoral awards have been made to students entering upon graduate study. There is no other Federal fellowship program which makes a significant number of awards at the first-year level. The program thus provides an important means whereby the Federal Government can assist in attracting more individuals to enter scientific careers. During past years less than 2 percent of the full-time graduate students in science and engineering received assistance through the fellowship program of the National Science Foundation.

The senior postdoctoral program was inaugurated during fiscal year 1956 to meet a need for support for more advanced and mature students than those who have but recently received their doctorate degrees. Specific objectives of the senior postdoctoral program are:

1. To provide opportunities for scientists who have demonstrated superior accomplishments in a special field to become still more proficient in their respective specialty by studying and doing research in outstanding laboratories.
2. To provide opportunities for scientists who wish to do so to study and undertake research in fields of science complementary to those in which they were trained, thus raising the level of our scientific potential by assuring increased recognition of, and competence in, interdisciplinary fields of science.
3. To enable teachers of science to spend a year in revitalizing their teaching through study and research at a center where these persons will be in daily contact with productive scientists.[19]

FOREIGN SCHOLARSHIPS UNDER THE FULBRIGHT PROGRAM

Public Law 584 of the 79th Congress authorized the Secretary of State to enter into agreements with foreign governments for the use of funds acquired from disposal of surplus property: (*a*) To finance research, instruction, and other educational activities for American citizens in institutions of higher learning in other countries and (*b*) To furnish transportation for citizens of other countries who desire to attend American colleges and universities. The act authorizes the expenditure over a period of 20 years of a total sum equivalent to approximately $140 million. In accordance with the law, a Board of Foreign Scholarships was appointed by the President to select individuals and institutions which are qualified to participate in the program, and to supervise the program. The Board in turn requested a Conference Board made up of the National Research Council, Social Science Research Council, American Council of Learned Societies, and the American Council on Education to set up a Committee on International Exchange of Persons for the purpose of nominating candidates for grants under this program. There are two representatives of each council on the committee. The secretariat of the committee is housed in the Academy-Research Council Building. A grant of $40,000 from the Rockefeller Foundation to the American Council of Learned Societies as the fiscal agent of the Conference Board took care of the expenses of organization. The National Research Council was given responsibility for the selection of mature scholars only—"professors, research workers, and specialists at the higher educational levels."

During 1947–48, the initial year of the program, only a few grants were awarded because at the close of the fiscal year only four countries—China, Burma, Greece, and the Philippines—had entered into the agreements necessary for participation in the program and, of these, programs had been put into operation only in China and Burma.

By the end of fiscal 1948–49, programs had been developed and put into operation for exchanges with Belgium, Luxembourg, Burma,

[19] *Sixth Annual Report, National Science Foundation, 1956.* Pp. 72–73.

France, Greece, Italy, New Zealand, Netherlands, Norway, the Philippines, and the United Kingdom. A total of 879 applications for grants was considered by the committee during the year. Of the 220 which were for work in the natural sciences, 79 awards were recommended to the Board of Foreign Scholarships.

During the fiscal year 1949–50, the program was extended to Australia, Egypt, India, Iran, and Turkey, and preliminary negotiations were in progress with Austria, Pakistan and Thailand. Political conditions in China and Korea caused the suspension of programs in those countries. A total of 1,795 applications was reviewed by the committee and of these 332 were recommended for awards. In addition, the committee performed numerous functions relative to arrangements and advisory service for foreign scholars coming to the United States under the program.

It should be noted that the grants made to American citizens for lecturing and advanced research represent only a fraction of the total number of awards made under the Fulbright program. Grants are also made to graduate students, elementary and secondary schoolteachers, and a like number of nationals of the participating countries. These grants do not come under the jurisdiction of the National Research Council.

During fiscal year 1950–51 preliminary negotiations were in progress for extension of the program to three additional countries—Denmark, Iraq, and Japan. A total of 1,925 applications was reviewed by the committee of which 480 were recommended for awards. Of these, 150 were in the natural sciences. A majority of the applicants desiring to work in the field of natural sciences wanted to go to the United Kingdom, France, Netherlands, Italy, Norway, Egypt and India.

The number of applications for grants continued to increase each year and in fiscal 1951–52, more than 2,000 applications were reviewed, of which 546 were recommended for awards.

The following is a cumulative record of the number of grants to Americans and foreign nationals from the start of the exchange program through 1955: [20]

Purpose of grant	Grants to Americans	Grants to foreign nationals
University study	5,598	8,068
Advanced research	1,097	2,120
Teaching	1,566	
Teaching or teacher development		1,742
University lecturing	1,135	480
Practical experience and training		27
For study in United States institutions abroad		2,917
Total (24,750)	9,396	15,354

Concerning the value of the Fulbright program, the Secretary of State made the following comment in a report to Congress on the 10th anniversary of the operation of Public Law 584: [21]

> In terms of lessening the likelihood of another war by promoting greater people-to-people understanding, the pro-

[20] U. S. Department of State. International Educational Exchange Service. Swords into Plowshares * * * The Story of the Educational Exchange Program Authorized by the Fulbright Act of 1946. Washington, Government Printing Office, 1956. 55 pp. At pp. 47–48.

[21] Swords and Plowshares, op. cit., pp. 1, 40.

gram has been described as the most fabulously profitable investment ever authorized by the Congress of the United States. Altogether, nearly 22,000 persons have been exchanged with 28 countries at a lower cost to the American taxpayers than 5 hours of fighting World War II.

* * * * * * * * * It is bringing about a new kind of chain reaction which may eventually work more powerfully for peace than nuclear weapons. * * *

ATOMIC ENERGY COMMISSION FELLOWSHIPS

A discussion of the fellowship activities of the National Academy of Sciences and the National Research Council in recent years should include information on the Atomic Energy Commission fellowships. Although AEC fellowships are no longer administered by the Academy-Research Council, this organization exercised an important function during the initial years of the program.

During fiscal year 1947–48, the Atomic Energy Commission provided more than a million dollars to support predoctoral and postdoctoral fellowships during the following year for training in those phases of the physical, biological, and medical sciences which are potentially related to the activities of the AEC. The purpose of the fellowships was to provide an increased number of scientific personnel from which the Commission might select persons to conduct its research programs. At the time, and until the National Science Foundation fellowship program was established, this was the largest scientific fellowship program ever sponsored by the Federal Government.

Because of its long and successful experience in the administration of fellowships, the Academy-Research Council was chosen to assist the Atomic Energy Commission in setting up the program and was given responsibility for the administration of it. The contract between the AEC and the National Academy of Sciences became effective as of January 1, 1948. Five fellowship boards were set up to administer the program: AEC–NRC Postdoctoral Fellowship Board in the Physical Sciences; AEC–NRC Postdoctoral Fellowship Board in the Biological and Agricultural Sciences; AEC–NRC Postdoctoral Fellowship Board in the Medical Sciences; AEC–NRC Predoctoral Fellowship Board in the Physical Sciences; and AEC–NRC Predoctoral Fellowship Board in the Biological Sciences.

Between May 1948 and June 30, 1949, meetings of the various fellowship boards were held at which times applications were considered and awards made as follows:

	Applications	Awards	
		1948–49	1949–50
Postdoctoral fellowships in physical sciences	89	16	25
Postdoctoral fellowships in biological and agricultural sciences	38	7	14
Predoctoral fellowships in physical sciences	740	153	134
Predoctoral fellowships in biological sciences	314	126	
Predoctoral technical fellowships in radiological physics	66	51	
Postdoctoral fellowships in medical sciences	[1] 89	[1] 55	

[1] Including 12 for renewals.

More than a million and a half dollars was expended for grants and scholarships for these 2 years; expenditures for the 3 main fields were:

	1948-49 [1]	1949-50 [1]
Medical sciences	$67,353.94	$157,322.72
Biological sciences	136,995.58	338,455.58
Physical sciences	325,251.30	540,613.87

[1] Source: Annual Reports of the National Academy of Sciences—National Research Council, for 1948-49 and 1949-50.

The whole program was profoundly affected in 1949 by the chain of events which was set off after an award was made in March 1949 for a predoctoral fellowship to begin July 1, 1949, to a person later discovered to be a member of the Communist Party. As a result of apprehension concerning the maintenance of national security in administration of the program, hearings were held before the Joint Congressional Committee on Atomic Energy and a subcommittee of the Senate Appropriations Committee, and the Independent Offices Appropriation Act of 1950 (Public Law 266) which was passed on August 24, 1949, contained a section intended to prevent a recurrence of the incident which precipitated the investigations:

> SEC. 102 (a). No part of any appropriation contained in this title for the Atomic Energy Commission shall be used to confer a fellowship on any person who advocates or who is a member of an organization or party that advocates the overthrow of the Government of the United States by force or violence or with respect to whom the Commission finds, upon investigation and report by the Federal Bureau of Investigation on the character, associations, and loyalty of whom, that reasonable grounds exist for belief that such person is disloyal to the Government of the United States: *Provided*, That any person who advocates or who is a member of an organization or party that advocates the overthrow of the Government of the United States by force or violence and accepts employment or a fellowship the salary, wages, stipend, grant, or expenses for which are paid from any appropriation contained in this title shall be guilty of a felony and, upon conviction, shall be fined not more than $1,000 or imprisoned for not more than one year, or both: *Provided further*, That the above penal clause shall be in addition to, and not in substitution for, any other provisions of existing law.

During the remainder of 1949, the Academy-Research Council directed prolonged attention to the determination of the course of action which it should take with regard to the continued administration of the AEC fellowship program, in light of the recently passed amendment. The position which the Academy-Research Council took on the matter was expressed in a statement presented to and approved by the membership of the Academy, and mailed to the General Manager, Atomic Energy Commission, on November 2, 1949:

> In our opinion the requirement of FBI investigation and Atomic Energy Commission clearance is ill-advised for those

fellows who neither work on secret material nor are directly preparing for work on Atomic Energy Commission projects. We are convinced that by this restriction the value of the broad program has been greatly reduced; we have doubts whether the continuance of the Atomic Energy Commission fellowship program thus restricted is in the national interests. * * *

Since we hold these views, we believe that the National Research Council should not accept the responsibility for administering the altered fellowship program.

We hope that, to the extent to which the Atomic Energy Commission continues the program, it will find it possible to administer it without our help. Nevertheless, in the measure in which our advice in one form or another may prove necessary to the Commission, we recognize an obligation to provide such advice.

Discussion and negotiation between the AEC and the Academy continued. Details of a limited AEC fellowship program which evolved from the negotiation were contained in a letter of December 9, 1949, from the General Manager AEC, to the President of the National Academy of Sciences:

* * * the Atomic Energy Commission requests the National Academy of Sciences to authorize the National Research Council to administer a program of Atomic Energy Commission fellowships in accordance with the following conditions:

1. Predoctoral fellowships will not be offered by the National Research Council for the academic year 1950–51.

2. In order that commitments in announcements of the predoctoral fellowships and of the postdoctoral medical felowships for 1949–50 shall be fulfilled, applications for renewal of current fellowships in these categories will be solicited by the National Research Council and renewal recommended for those whose progress warrants it. However, because of the amendment to the Independent Offices Appropriation Act of 1950, such recommendations can become effective only after the applicant has been investigated as to character, associations, and loyalty by the Federal Bureau of Investigation and clearance given by the Atomic Energy Commission. Hence those whose applications for renewal are approved by the National Research Council will receive from the Atomic Energy Commission a copy of the amendment referred to above and a personnel security questionnaire which must be filled out and returned before the FBI investigation can be initiated. Decisions by AEC, based upon the FBI report, will determine the fellowship awards.

3. The National Research Council will administer a limited program of postdoctoral fellowships in the physical sciences, biology, biophysics, and medicine for advanced training in fields of secret work or in problems which require access to restricted data. For holders of these fellowships,

FBI investigation and full security clearance constitute an accepted requirement.

* * * * *

4. The administrative commitments set forth in this letter do not extend beyond June 30, 1951.

During fiscal year 1949–50, the last year the program was administered by the National Research Council, only renewals of grants previously made were handled. Early in fiscal year 1950–51, responsibility for administration of the AEC fellowships was transferred to the Fellowship Board of the Oak Ridge Institute of Nuclear Studies. Fellowship boards of the Council continued for a few years to assist in evaluating the scientific qualifications of candidates for fellowships, and submitted their recommendations to the Oak Ridge Board.

At present all fellowships of the Atomic Energy Commission are administered by the Oak Ridge Institute of Nuclear Studies except for those in industrial medicine which are administered by the University of Rochester atomic energy project, Rochester, N. Y. On October 30, 1956, the AEC announced a special fellowship program established to encourage more students at the graduate level to study nuclear energy technology, with particular emphasis on reactor development. One hundred seventeen students were offered fellowships under this program for the academic year 1957–58. Under other special fellowship programs, 84 appointments were made in radiological physics, 9 in industrial medicine, and 9 in industrial hygiene, also for the 1957–59 academic year.[22]

[22] Twenty-second semiannual report of the Atomic Energy Commission, July 1957, Washington, U. S. Government Printing Office, 1957; 257 p.; at p. 80.

SECTION 3

SCIENTIFIC PROGRAMS ABROAD

PREPARED FOR THE
SENATE COMMITTEE ON GOVERNMENT OPERATIONS

BY
DR. WALLACE R. BRODE
PRESIDENT OF THE AMERICAN ASSOCIATION FOR THE
ADVANCEMENT OF SCIENCE

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SCIENTIFIC PROGRAMS ABROAD

At the request of the staff of the Committee on Government Operations, Dr. Wallace R. Brode, president of the American Association for the Advancement of Science, submitted detailed charts of the outline of the organizational structure of scientific activities in Belgium, Denmark, Canada, France, the Netherlands, Sweden, the United Kingdom, and Germany. These charts or tables, the corresponding number of which is indicated parenthetically under each of the countries, are in the files and are available to members of the committee and to other Members of Congress who may wish to examine them.

Dr. Brode also submitted the following brief comments regarding this data:

> In accordance with your request at the time you called on me, I am enclosing a brief résumé with references relative to the organization of governmental administered science in certain foreign countries which we consider are on the same technical level as our own. I have not included Russia, on which I assume you can directly obtain advice and information from the Central Intelligence Agency. If there is information on the organizations of science in Russia, one could expect such to be classified.[1]

Foreign Science

The best outline of foreign and United States science for the purpose of comparison of relative structures and organizations is to be found in the Organization for European Economic Cooperation, volume III, digest on this subject.

While this collection was concerned with applied research, they have in general covered the entire Government interest in both basic and applied research for the following countries: Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands, Norway, Sweden Switzerland, and United Kingdom.

I am assuming that a copy of this document and the reference material is available to your committee and staff through the Library of Congress Reference Service.

1. The Organization of Applied Research in Europe, the United States and Canada. Published by the Organization for European Economic Cooperation, Paris, 3 volumes (1954).
2. The National Research Council Review, 1956, No. 3976. National Research Council, Ottawa, Canada.

[1] An unclassified portion of an address by Brig. Gen. J. J. Davis, Office of the Chief of Intelligence, Department of the Army, on January 28, 1958, before U. S. Army Reserve Officers among the Members of Congress and their staffs, on the subject of research and development in the USSR, and the manner in which the entire USSR educational structure, military and civilian, is geared to the research and development needs of that country; and a list of 157 institutes, commissions, laboratories, societies, and other types of research and technological organizations established by the USSR, entitled "Departments of the Academy of Sciences of the USSR," are incorporated in the committee files.

3. Scientific and Academic Life in Western Germany. A Handbook. 1957. Stifterverband fur Die Deutsche Wissenschaft. Essen-Bredeney, Germany.
4. Department of Scientific and Industrial Research Report for the Year 1954–55. D. S. I. R., Charles House, London, England.

General

Many of the separate countries of Europe are of an equivalent size to many of our separate States and the support of State universities is not unlike the national universities in this country. However, our separate States seldom support basic research institutions separately from universities as in these separate nations and such responsibilities must rest on our National Government.

In most countries there has been a definite effort to organize and coordinate basic research in universities and public laboratories and to some extent in industry, so as to conserve the scientific abilities and facilities. It should be noted that in a number of countries there is a Ministry of Education, and in some countries the scientific research program is in part under this Ministry. Differing from a prevalent concept of education, which is not in accord with the European concept of education, in Europe a Minister of Education is concerned with a cultural aspect, including higher education.

BELGIUM

In Belgium there is a broad subdivision of basic science and agricultural science, both of which are directly tied to the corresponding ministries. The basic science group is known as F. N. R. S. (Le Fonds National de la Recherche Scientifique) and provides subsidies, scholarships, and grants to universities and research institutions. (See table 1.)

DENMARK

The Prime Minister maintains a Technical Scientific Research Council which receives distribution funds for scholarships, research, subsidies, and equipment aid (table 2).

CANADA

With an area greater than the United States, a population one-tenth of the United States, and, by reason of nearness and relationship, a governmental pattern which is a cross between the United States and the United Kingdom patterns, we can expect Canada to have much of interest to us in the pattern of its research support and treatment of science in the Government.

As shown in the organizational structures table 4 and table 5, there are six ministries (equivalent to Cabinet heads) under whom there are separate research laboratories. These laboratories are not broad general laboratories, but are concerned with rather narrow specific interests, defense, mines, fisheries, etc.

The National Research Council of Canada is not a Cabinet-level post, but, rather, is under a committee of the Privy Council consisting of the ministers of seven of the Privy Council departments.

This committee of the Privy Council is primarily concerned with the selection of the members of the council. The council is composed of 21 members, who are scientists or engineers from the major universities and industrial organizations. Seven members are appointed each year for a 3-year term and, except for the permanent officers, serve without salary.

The laboratories and grants-in-aid are directed by the council. There are 9 divisions and 2 regional laboratories. These include medical research, pure chemistry, applied chemistry, pure physics, applied physics, applied biology, mechanical engineering, radio and electrical research, building research, prairie regional research, and Atlantic regional research.

Its annual budget amounts to about $20 million, which, for a country with one-tenth the population of the United States, represents a major support of nondefense research when one considers that this does not include university costs or money applied to laboratories under separate ministries.

FRANCE

As a country of some size, the greater administrative problems in France more nearly approach those of the United States Government.

Scientific research in France is the prime responsibility of the Ministry of Agriculture with respect to agriculture, Ministry of Defense with respect to military research, and Ministry of Education with respect to basic scientific research. Under this latter Ministry is the National Center of Scientific Research (CNRS), which provides research grants and controls a number of Government-supported, basic-research laboratories. The national center of scientific research (CNRS) was created by the combination of two former programs, one to support basic research and the other to support applied research. The fusion of these two areas was considered of great importance by the French.

CNRS covers two major areas of human knowledge:

(*a*) Natural sciences: Mathematics, astronomy, physics, chemistry, biology, and experimental medicine.

(*b*) Humanistic sciences: Anthropology, archeology, ethnography, geography, philology, literature, music, psychology, history, and philosophy.

Such a grouping essentially covers the broad advance of human knowledge.

The organizational structure of CNRS is headed by a national committee quite similar to the Board of the National Science Foundation in this country. For each subject, such as Organic Chemistry, there is a panel of 12 members, 4 of whom are named by the Ministry of Education on recommendation of the director of the center. The remaining eight are nominated by representatives of higher education, Government, and private research, and educational establishments and research workers on the CNRS staff. The latter representatives are interesting in that there is a recognition that the CNRS staff is competent to name members to the management, just as in a very few universities the faculty have an opportunity to name management representatives. (Oxford and Cambridge are examples.)

This national committee serves for 6 years, with one-half appointed every 3 years.

A director coordinates the recommendations of the national committee. This directorate includes:

(1) A director and two assistant directors.

(2) Three members nominated by the Ministry of Education on recommendation of the director (natural science, 2 members; humanistic sciences, 1 member).

(3) Six members nominated by the Minister on recommendations of each of the two categories comprising the national committee (natural sciences, 4 members; humanistic sciences, 2 members).

The organizational chart would indicate that CNRS is separate from universities, although, in practice, there is a close liaison.

Directly under CNRS are 15 large research laboratories, as well as partial subsidies to many research and university laboratories and grants-in-aid to students and research workers. (See table 3.)

NETHERLANDS

As indicated in tables 6 and 7, the support of research (basic and applied) and universities are carried on generally under the combined ministries, with a degree of interconnections between the pure science (ZWO), universities, and the applied scientific research organization (TNO).

The pure science organization (ZWO) does not have separate laboratories, but makes grants to universities and research organizations. The applied research organization (TNO) is not a governmental organization, but is under the influence of the Government. TNO operates under a group composed of 50 percent representation of scientists and 50 percent industrial and economic interests. (Tables 6 and 7.)

SWEDEN

The state government supports the research councils, government laboratories, and universities although in some cases part of the support comes from municipalities and industry. (Table 8.)

The separate research councils are appointed by the King, generally on recommendation of appropriate academies. (Table 8.)

UNITED KINGDOM [2]

From the organizational chart (table 9) on the Organization of Scientific Research, it should be noted that the research responsibilities are divided between three Privy Council committees, agriculture, medical, and scientific and industrial research.

The Department of Scientific and Industrial Research (DSIR) in its guidance of scientific research has three major areas of activities: (*a*) research grants, (*b*) research laboratories and establishments, and (*c*) research associations.

The Lord President of the Privy Council serves as president of the advisory council on scientific policy and is the Minister who advises Parliament on the agricultural and medical, as well as industrial and scientific research.

[2] See sec. 4 for detailed operations of DSIR, p. 140.

The annual report of the Department of Scientific and Industrial Research for the years 1954–55 gives a detailed outline of the program of this organization. The extensive list of laboratories (table 10) indicates a broad area of supported research in areas of interest to the Government.

Particular notice should be given to the activities of the building research laboratories which provide a public service in this area to the homeowner and builder much as agricultural research provides for the farmer. (Tables 9 and 10.)

GERMANY

Essentially the discussion of Germany deals with the Federal Republics of Germany. The organization of science has recently been described in Chemical and Engineering News (C and EN, 35 (No. 43, Oct. 28) p. 72 (1957)). There has been established in Germany a Council of Arts and Sciences. The council has 39 members, 22 nominated by the President, 17 members are nominated by the state and Federal Governments. Included in the German structure are the 32 German universities, the scientific academies, the Max Planck laboratories, and certain private research laboratories. A more detailed discussion of the organization of German science is to be found in Scientific Life in Western Germany, published in 1957 by the Stifterverband fur die Deutsche Wissenschaft. (See table 11.)

In the distribution of funds by the German research council, there is no direct control by the state and a point is made that "This insures the complete freedom of scientific research." On bodies which decide on the distribution of funds, the representatives of the state are not in the majority. (Table 11.)

AUSTRALIA AND NEW ZEALAND

These two countries, like the United Kingdom follow in a similar pattern except that both of these include a broader area than the United Kingdom in that agricultural research is also included so that nearly all of science is included with the exception of medical research (31st Annual Report of the Department of Science and Industrial Research. New Zealand, H. 34–1957; and Commonwealth Scientific and Industrial Research Organization. No. 7, 1954–55 Annual Report).

SECTION 4

THE DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH IN THE UNITED KINGDOM

PREPARED FOR THE
SENATE COMMITTEE ON GOVERNMENT OPERATIONS

BY
DOROTHY M. BATES
ANALYST IN AMERICAN GOVERNMENT
SENIOR SPECIALISTS DIVISION
LEGISLATIVE REFERENCE SERVICE
LIBRARY OF CONGRESS

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DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH IN THE UNITED KINGDOM [1]

Summary Statement on Civilian Scientific Research in the United Kingdom

Civilian scientific research in the United Kingdom is carried on in many branches of the Government. The table reproduced below which lists Government expenditure on civil research (excluding research by defense departments except as indicated) shows the extent of the dispersal: [2]

Government expenditure on civil research (excluding research by Defense Departments other than as shown)

[In thousands of British pounds (£'s) 1956–57 (estimate)]

A. Agriculture, forestry, fisheries, and food:	
(i) Agriculture	[1] 1, 922
(ii) Fisheries	590
(iii) Agricultural Research Council	3, 470
(iv) Development Fund	[3] 363
(v) Nature Conservancy	280
(vi) Forestry Commission	[3] 248
	6, 783
B. Industry and communications:	
(i) Department of Scientific and Industrial Research	[3] 7, 352
(ii) Ministry of Fuel and Power	889
(iii) Ministry of Transport and Civil Aviation	279
(iv) Post Office	660
(v) Board of Trade (ex Ministry of Materials)	13
(vi) Ministry of Works	[3] 2, 351
	11, 544
C. Medical and health:	
(i) Health Departments	82
(ii) Medical Research Council	[3] 2, 262
(iii) General Register Office	43
(iv) Air Ministry	303
	2, 690
D. Overseas research:	
(i) Colonial Office	[3] 1, 469
(ii) Commonwealth Relations Office	67
	1, 536
E. Other:	
(i) Government Chemist	66
(ii) Air Ministry—Meteorology	345
(iii) Admiralty—Observatories and Oceanography	289
	700
F. Grants to learned societies and for other scientific societies	234
Grand total	23, 577

[1] Agriculture and food.
[2] Adjusted for economy cuts in 1956–57 estimates: Excludes expenditure on civil-defense projects.
[3] Capital expenditure on new buildings for DSIR and other research establishments.

[1] The Stanford Research Institute prepared in 1952 booklets on the Organization of Industrial Research in Italy and Austria.

[2] Data taken from Appendix III, Government Expenditure on Civil Research (excluding research by Defense Departments other than as shown), from Ninth Annual Report of the Advisory Council on Scientific Policy (1955–56), London: H. M. S. O., November 1956, 12 p. Cmnd 11. At p. 11.

From the above table it will be noted that the largest single expenditures for research, excluding capital expenditure, are those of the Department of Scientific and Industrial Research, the Agricultural Research Council, and the Medical Research Council. These three main organizations serve the Government as a whole. The Lord President of the Council is the Minister responsible for these three organizations, and for the formulation and execution of Government scientific policy on matters which relate to the whole field of civil science. He is advised by an Advisory Council on Scientific Policy. Research related to specific and practical problems is done by or under the auspices of particular Government departments, and the Ministers of the departments are responsible for the scientific establishments within their own departments. A pictorial review of all scientific research in Great Britain is contained on the composite organization chart, at page 183 (Vol. II), of *the Organisation of Applied Research in Europe, the United States, and Canada* published by the Organisation for European Economic Cooperation (1954).[3]

Establishment of the Department of Scientific and Industrial Research[4]

It was during the First World War that the importance of scientific research and of the application of scientific knowledge to trade and industry was recognized, and in 1916 the Government founded the Department of Scientific and Industrial Research. An Advisory Council for Scientific and Industrial Research, composed of eminent scientists and leading industrialists, two members closely connected with organized labor, and assessors appointed by Government departments, was formed to advise the Lord President of the Council concerning the department.

The objectives of the DSIR have been defined as follows:[5]

> (i) To insure that the applied scientific research carried out by the Department is at all times related to the economic problems confronting this country, and that the scientific resources of the Department are applied to those problems the solution of which would most assist the national economy.
>
> (ii) To insure that the resources of the Department are used so as to make the maximum contribution to improving the efficiency of industry, particularly in relation to productivity, new products and new processes.
>
> (iii) Without subtracting from the responsibilities of production departments and nationalized industries for development, the Department of Scientific and Industrial Research should exert its maximum influence in securing the effective application of the results of its researches.

These objectives have been translated into three main groups of activities, each of which is described below:

> (i) Scientific research in the national interest, and to meet the needs of Government departments,

[3] On file with committee.

[4] Much of the background information on DSIR is drawn from the publication, Government Scientific Organization in the Civilian Field, by the Advisory Council on Scientific Policy, London, H. M. S. O., July 1951, 47 p. This review covers the period 1900–1950.

[5] Third Annual Report of the Advisory Council on Scientific Policy (1949–50), Cmd. 7992. London H. M. S. O., 1950. 17 p. At p. 8.

(ii) The encouragement of research and the application of scientific knowledge in industry, and

(iii) The encouragement of fundamental research at universities and elsewhere, and the maintenance of an adequate supply of trained research workers for laboratories of all kinds.

The first activity, that of scientific research in the national interest, and to meet the needs of Government departments, is performed through the national research laboratories in each of the 14 research organizations which with 1 exception [6] are under the direct control of DSIR and are financed from its own vote. With the exception of the National Physical Laboratory, each of the research organizations established by DSIR is under the immediate control of a director of research who is advised by a board appointed by the Lord President, and composed of independent scientists and industrialists, with assessors representing Government departments and in some cases, Commonwealth Governments. The scientific work of the National Physical Laboratory is supervised by an executive committee appointed by the Royal Society and accepted by the Lord President as a committee of the Department. A listing of these establishments with their component units is contained in appendix IV of the Report for the Year 1955–56 of the Department of Scientific and Industrial Research, June 1957, at pages 234–235.[7] A brief description of the fields of research of each of these organizations is given in appendix A.

The principal means by which the Department promotes industrial research is through the research associations which have been established on a cooperative basis in many branches of industry. These research associations which at present number 46 are financed by the industries but receive assistance through grants from the DSIR. A listing of research associations and other organizations aided by grants from the DSIR is included as appendix V of the Department's Report for the Year 1955–56 at pages 236–242.[7]

The third major activity of the DSIR—encouragement of fundamental research at universities and elsewhere, and the maintenance of an adequate supply of trained research workers for laboratories of all kinds—is one in which responsibility is shared with the University Grants Committee. However, while the University Grants Committee is generally responsible for the administration of Government funds for research at the universities, the DSIR makes grants to individual research workers in support of specific investigations, provides grants to postgraduate students training as research workers in the universities, and makes awards to advanced scholars who distinguish themselves in fields of research.

An additional significant activity of the DSIR is its increasing role in the collection and dissemination of scientific and technical information, both that resulting from its own research activities, and information from other sources, domestic and foreign.

So far as making the results of its own research available, the DSIR publishes abstracts of scientific information relating to building, food, fuel, radio, roads, and water pollution, and maintains a collection of unpublished documents containing scientific and technical informa-

[6] The Fire Research Organization is maintained jointly by the Department and the Fire Office Committee.

[7] On file with the committee.

tion including those of the Technical Information and Documents Unit. In addition most of the DSIR stations and the research associations maintain information services and provide technical information to firms who request it.

In its 1953–54 annual report, and again a year later, the Advisory Council on Scientific Policy recommended the establishment of a National Lending Library for Science and Technology and it was proposed that the DSIR be given responsibility for such a library. This was agreed to by the DSIR providing additional funds for the project were made available, and it was understood that a nucleus of the Library would be provided by the transfer, at an appropriate time, of lending activities and a small part of the collection of the Science Library at South Kensington. As of early 1957, the Department was proceeding with the necessary planning for this extensive operation.

According to the ninth annual report (1955–56) of the Advisory Council on Scientific Policy, of the more than 14,000 scientific and technical books published in Russian in 1954, the DSIR received about 300. The report recommended that the DSIR should start a collection of Russian scientific and technical literature as the first section of the National Lending Library for Science and Technology.

The DSIR makes translations of individual articles from Russian periodicals for a moderate fee whenever two or more requests for a translation are received. A publication entitled "Translated Contents Lists of Russian Periodicals" which contains also a listing of recent accessions of Russian scientific and technical books and parts of serial publications available in the British Museum is issued monthly by the Technical Information Service of DSIR.

A breakdown of expenditures for the major activities of the DSIR for the year ended March 31, 1956, is given below:

Summary of expenditures of the Department, year ended Mar. 31, 1956

Organization	Gross [1]	Receipts	Net
Headquarters, administration, etc.	£274,838	£2,287	£272,551
Headquarters, overseas liaison	97,598	21,363	76,235
National physical laboratory	949,890	407,222	542,668
Building research	528,450	35,749	492,701
Chemical research laboratory	196,371	57,145	139,226
Fire research	85,431	53,650	31,781
Food investigation	364,472	5,944	358,528
Forest products research	120,496	4,335	116,161
Fuel research	305,212	16,952	288,260
Geological Survey and Museum	322,580	54,534	268,046
Hydraulics research	100,797	16,751	84,046
Mechanical engineering research	455,326	19,320	436,006
Pest infestation	80,222	7,938	72,284
Radio research	107,275	3,156	104,119
Road research	414,788	26,352	388,436
Water pollution research	76,819	337	76,482
Miscellaneous programs	17,798	16,796	1,002
Grants for research:			
Annual grants to research associations	1,423,775		1,423,775
Special grants to research associations	70,905		70,905
Grants to students, etc.	319,919	406	319,513
Grants for special researches	373,028	18,121	354,907
American aid: Provision of technical equipment	12,211		12,211
American aid: Promotion of productivity	128,888	153,687	[3] [2] 24,799
Contributions to European nuclear research	519,996		519,996
Contributions to other international organizations	3,653		3,653
Total	7,350,738	922,045	6,428,693

[1] Includes the cost of work for boards and committees at other stations of the Department.
[2] Represents charges for salaries under "Headquarters, administration, etc."
[3] Credit.

The total number of staff of all grades, industrial as well as non-industrial, employed in DSIR on October 1, 1956, was 4,655 (including 200 part-time employees). This was an increase of 276 compared with the previous year. Comparative figures during the period 1925–50 show a steady growth in the Department: In 1925, the DSIR had 473 employees; 1930, 682; 1939, 918; and 1950, 1,805 (Great Britain. Advisory Council on Scientific Policy. Government Scientific Organisation in the Civilian Field, 1951, p. 7.)

Recent Changes in the Organization of the DSIR

The continuing increase in the activities and staff of the DSIR caused organizational stresses within the Department, and in April 1955 a Committee of Enquiry was appointed by the Lord President of the Council to investigate the organization and functioning of the Department. In October 1955 the Committee of Enquiry submitted an interim report in which it recommended the creation of an executive council on the model of the Medical Research Council and the Agricultural Research Council to replace the Advisory Council for Scientific and Industrial Research in directing the research activities of the DSIR. Although the committee put itself on record as opposed to the organization of the DSIR as a "normal department," and said it preferred the arrangements of the Medical Research Council for a research agency under the Government, it made no recommendation for change in that regard. The committee's report was accepted by the Government and the recommendation was incorporated into the Department of Scientific and Industrial Research Act, 1956, which was passed on August 2, 1956, and was brought into force on November 7, 1956.[8] In addition to providing for a chairman and 12-member Executive Council for Scientific and Industrial Research, the bill provided specifically for the expenditure of the Department to be met out of funds provided by Parliament. The Research Council was charged with the organization, development, and encouragement of scientific and industrial research and with the dissemination of the results of such research, and in particular, to:

(*a*) Encourage and support scientific research in universities, technical colleges and other institutions;

(*b*) Establish or develop institutions or departments of institutions for investigation and research relating to the advancement of trade and industry; and

(*c*) Take steps to further the practical application of the results of scientific and industrial research.

The concluding report of the Advisory Council for Scientific and Industrial Research summarized the operation of the DSIR from its establishment to November 1956 when the new act became effective:

> From that date we as an advisory council ceased to exist and an experiment in organization of Government-sponsored scientific research begun 41 years ago was completed. We trust we may fairly say, on behalf of our distinguished predecessors rather than for ourselves, that the experiment has

[8] Text of act is contained in appendix I of the Department's report for the year 1955–56, at pp. 215–217. On file with the committee.

been a conspicuous success; and we were glad to note that the prevailing tone of the parliamentary debate was emphatically in this sense, notwithstanding some doubts as to the significance of some passages in the report of the committee of inquiry reflecting on the efficiency of some of the Department's work. We ourselves believe that the stock-taking, after 41 years, has been well worth while and that our replacement by a body constituted not dissimilarly from ourselves but with powers to act, and not only to advise, is a natural outcome of experience and a reflection also of the necessities for an organization which has grown to a size probably exceeding the expectation of most, if not all, of its most enthusiastic founders. * * *

Appendix A

Research Organizations

The *National Physical Laboratory* is the largest of the Department's establishments. Its main divisions are concerned with aerodynamics, electricity, engineering, light, mathematics, metallurgy, metrology, physics, radio and electronics. The Laboratory also determines the value of fundamental physical constants to the accuracy required by science and industry, and investigates the properties of materials.

The *Building Research Station* carries out research on the strength and stability of buildings, their thermal and sound insulation, architectural acoustics, lighting, fire resistance, etc., and on new and traditional building materials and methods. The station's activities also extend into the field of civil engineering and include work on the stability of earth dams, riverbanks, retaining walls, excavations, and on the strength of bridges.

The *Chemical Research Laboratory* undertakes investigations for Government departments and carries out chemical research of general basic importance to industry where this is not adequately covered elsewhere.

The *Fire Research Organization* studies the scientific problems of fire fighting, fire prevention, and the safety of life in fires, and investigates the factors contributing most to outbreaks of fire.

The *Food Investigation Organization* undertakes fundamental studies relating to the properties of foods and the examination of the possibilities of new and improved practical methods in the storage, processing, and distribution of foods. Close contact is maintained with the Ministry of Food.

The *Forest Products Research Laboratory* carries out research on the structure and strength of wood, its seasoning and preservation, on the manufacture and properties of plywood, wood bending, etc., and on the utilization of timber of lesser known colonial species.

The *Fuel Research Station* undertakes basic research on the constitution of coal and the chemistry of fuel processes, and is concerned with the more efficient use of coal for steam raising and domestic heating, and its conversion into gaseous and liquid fuels, oils, and chemicals. In collaboration with local authorities and other bodies, the station studies atmospheric pollution.

The *Geological Survey* studies the geology of Great Britain, recording and publishing its results in the form of maps and explanatory memoirs. The Survey collaborates with the National Coal Board in the study of coalfield geology, with the Ministry of Health on underground water resources, and with the Ministry of Supply concerning the discovery and evaluation of raw materials for atomic energy plants.

The *Hydraulics Research Organization* is concerned with civil engineering research relating to marine work, such as docks and harbors, rivers, canals, and other waterways.

The *Mechanical Engineering Research Organization* undertakes basic and general research on problems of importance to engineering development.

The *Pest Infestation Laboratory* carries out research on the infestation of stored foodstuffs, especially grain, by insects, mites, and fungi. Close contract is maintained with the Infestation Control Division of the Ministry of Agriculture and Fisheries, which is responsible for the inspection of imported foodstuffs and the application of measures for insect control.

The *Radio Research Organization* undertakes research on the problems of radio communication, particularly on the propagation of radio waves and the investigation of radio disturbances caused by thunderstorms.

The *Road Research Laboratory* carries out research on the materials and methods of road construction, the problems of road safety and traffic, and the use of machinery in road construction. The Laboratory cooperates in road trials with the Ministry of Transport, the Motor Industry Research Association, the police, and local authorities.

The *Water Pollution Research Laboratory* carries out research into methods for the treatment of water, sewage, and industrial wastes, and investigates the effects of the discharge of polluting substances into rivers, estuaries, etc.

Source: *The Organization of Applied Research in Europe, the United States, and Canada.* Vol. II: *Applied Research in Europe.* Published by the Organization for European Economic Cooperation. 1954. At pp. 172-173.

SECTION 5

ANALYSIS OF LEGISLATION RELATED TO IMPROVEMENT OF SCIENTIFIC STUDY, TEACHING, AND PROGRESS IN THE UNITED STATES

79th Congress to 85th Congress, 1st Session
1945–57

PREPARED FOR THE
SENATE COMMITTEE ON GOVERNMENT OPERATIONS

BY
DOROTHY M. BATES
ANALYST IN AMERICAN GOVERNMENT
SENIOR SPECIALISTS DIVISION
LEGISLATIVE REFERENCE SERVICE
LIBRARY OF CONGRESS

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ANALYSIS OF LEGISLATION RELATED TO IMPROVEMENT OF SCIENTIFIC STUDY, TEACHING, AND PROGRESS IN THE UNITED STATES, 1945–57

Introduction

The attached analysis of proposed legislation has been compiled from final issues of the Digest of Public General Bills [1] for each session beginning with the 79th Congress, 1st session. It is presented in response to the request contained in your memorandum of November 25, 1957, for "an analysis of the provisions of bills previously introduced in the Congress on any aspect of the proposed program. * * *"

The index to the final issue of the bill digest for each session was carefully searched for references to proposals which dealt with the overall reorganization of governmental scientific activities, the training of scientists and engineers in particular, and aid to higher education in general. From the results of this search a listing has been made of all relevant proposals found. Included are the author of the proposal, date of introduction, committee to which the proposal was referred, record of action taken, and, where the field of science and engineering was directly concerned, a digest of the bill was contained in the listing or attached.

We are aware that a complete listing of all legislation in this field would necessitate a considerably more extensive search than we have been able to make within the time available. However, when the cumulative record of legislation in the field of science is thus examined, certain facts become evident:

1. Prior to the covening of the 2d session of the 85th Congress, there was only one previous proposal to create a Department of Science and Research—that of Mrs. Luce, H. R. 5332, 79th Congress.

2. Similarly, there has been only one other proposal to establish a United States Science Academy—H. R. 6164, introduced by Mrs. St. George, 85th Congress.

3. Action was taken on only a small proportion of the dozens of proposals listed, and an even smaller number became public laws. These were:

79th Congress

H. R. 6486; approved July 31, 1946 (Public Law 580). Authorizes $975,000 for a geophysical institute at the University of Alaska.

Reorganization Plan No. III, part VIII, section 801 (1949). Transferred the Canal Zone Biological Area to the Smithsonian Institution.

81st Congress

S. 247; approved May 10, 1950 (Public Law 507). Creates a National Science Foundation.

S. 443; approved October 25, 1949 (Public Law 366). Authorizes construction and equipment of a radio laboratory building for the National Bureau of Standards.

[1] Prepared by Legislative Reference Service, Library of Congress.

S. 868; approved September 9, 1950 (Public Law 776). Establishes in the Department of Commerce a clearinghouse for the collection and dissemination of technological, scientific, and engineering information, useful to business and industry.

H. R. 3417; approved August 22, 1949 (Public Law 259). Authorizes appropriations for the Astrophysical Observatory of the Smithsonian Institution.

83d Congress

H. R. 9040; approved July 26, 1954 (Public Law 531). Authorizes Commissioner of Education to enter into contracts with universities and state educational agencies for the conduct of research.

H. R. 9936; approved August 26, 1954 (Public Law 663). Supplemental Appropriation Act, 1955—Initial appropriation to the National Science Foundation for the International Geophysical Year.

84th Congress

H. R. 5240; approved June 30, 1955 (Public Law 112). Appropriation in Independent Offices Appropriation Act, 1956, to National Science Foundation for the International Geophysical Year.

S. 2379; approved August 8, 1956 (Public Law 1027). Makes an annual appropriation for vocational education in the fishery trades and industry.

H. R. 10004; approved May 19, 1956 (Public Law 533). Appropriation in Second Supplemental Appropriation Act, 1956, to National Science Foundation for the International Geophysical Year.

H. R. 10875; approved May 28, 1956 (Public Law 540). A bipartisan Commission on Increased Industrial Use of Agricultural Products established.

85th Congress [2]

S. 1856; approved August 14, 1957 (Public Law 85–133). Responsibility defined for coordination of technical information concerning air traffic control and air defense systems applicable to civil and military aviation.

Legislation Related to Improvement of Scientific Study, Teaching and Progress in the United States, 79th Congress–85th Congress, 1st Session, 1945–57

79th Congress, 1st session

Create within the Department of Commerce a Bureau of Scientific Research

S. 1248. Mr. Fulbright July 9, 1945 (Commerce). Reported in Senate January 29, 1946. (See appendix, p. 166.)

Establish a scientific and technological advisory committee

H. R. 2937. Mr. Randolph; Apr. 18, 1945 (Interstate and Foreign Commerce). No action taken.

Bill would establish a Scientific and Technological Advisory Committee of designated department heads to deal with the problem of reemployment and rehabilitation of workers displaced by technological changes.

[2] To February 6, 1958. See additional summary of bills introduced in 2d sess. of 85th Cong., to Mar. 1, 1958, p. 161–166.

79th Congress, 2d session

Create in the executive department a department of science and research

H. R. 5332. Mrs. Luce; February 1, 1946 (Expenditures in the Executive Departments). No action taken. (See appendix, p. 166.)

Create within the Department of Commerce an office of technical services

H. R. 6118. Mr. Priest, April 13, 1946 (Interstate and Foreign Commerce). No action taken. (See appendix, p. 167.)

Geophysical institute at University of Alaska

H. R. 6431. Mr Bartlett, May 14, 1946 (Territories). No action taken.

H. R. 6486. Mr. Bartlett, May 20, 1946 (Territories). Approved July 31, 1946 (Public Law 580).

Authorizes $975,000 for a geophysical institute at the University of Alaska, not more than 20 percent to be used for construction of housing accommodations for personnel carrying on the program. In the discretion of the director, facilities may be extended, without charge, to representatives of nonprofit scientific societies engaged in geophysical research.

Create a National Science Foundation

S. 1850. Mr. Kilgore and others, February 21, 1946 (Military Affairs). Passed by Senate July 3, 1946.

H. R. 6672. Mr. Celler, June 4, 1946 (Interstate and Foreign Commerce). No action taken.

Transfer of Canal Zone Biological Area to Smithsonian Institution

Reorganization Plan No. III, part VIII, section 801.—Canal Zone Biological Area—The functions of the Board of Directors of the Canal Zone Biological Area (which Board is provided for in the act of July 2, 1940 (54 Stat. 724, ch. 516) [secs. 1381–1387 of title 48], together with the functions of the Executive Officer of such Board, are hereby transferred to the Smithsonian Institution. The said Board of Directors and the office of the said Executive Director are hereby abolished. (5 U. S. C. 133y–4; 20 U. S. C. 79, 79a.)

80th Congress, 1st session

Create a National Science Foundation

S. 525. Mr. Thomas of Utah, February 7, 1947 (Labor and Public Welfare). No action taken.

S. 526. Mr. Smith and others, February 7, 1947 (Labor and Public Welfare). Vetoed August 6, 1947. (See appendix, p. 168.)

H. R. 942. Mr. Celler, January 14, 1947 (Interstate and Foreign Commerce). No action taken.

H. R. 1815. Mr. Case of New Jersey, February 10, 1947 (Interstate and Foreign Commerce). No action taken.

H. R. 1830. Mr. Mills, February 10, 1947 (Interstate and Foreign Commerce). No action taken.

H. R. 1834. Mr. Priest, February 10, 1947 (Interstate and Foreign Commerce). No action taken.

H. R. 2027. Mr. Hays, February 18, 1947 (Interstate and Foreign Commerce). No action taken.
H. R. 4102. Mr. Wolverton, July 7, 1947 (Interstate and Foreign Commerce). Laid on table July 16, 1947; S. 526 passed in lieu.

Technical Information and Services Act

S. 493. Messrs. Fulbright and Aiken, February 5, 1947 (Expenditures in the Executive Departments). Reported in Senate June 27, 1947. (See appendix, p. 167, and p. 8, pt. I.)

80th Congress, 2d session

Create a National Science Foundation

S. 2385. Mr. Smith and others, March 25, 1948 (Labor and Public Welfare). Passed by Senate May 5, 1948.
H. R. 4852. Mr. Priest, January 6, 1948 (Interstate and Foreign Commerce). No action taken.
H. R. 5532. Mr. Heselton, February 24, 1948 (Interstate and Foreign Commerce). No action taken.
H. R. 6007. Mr. Wolverton, March 25, 1948 (Interstate and Foreign Commerce). Reported in House June 4, 1948.
H. R. 6238. Mr. Van Zandt, April 14, 1948 (Interstate and Foreign Commerce). No action taken.

81st Congress, 1st session

Astrophysical Observatory of the Smithsonian Institution

H. R. 3417. Mr. Cannon, March 10, 1949 (House Administration). Approved August 22, 1949 (Public Law 259). (Ch. 494, 63 Stat. 623).

SEC. 2. Appropriations are hereby authorized for the maintenance of the Astrophysical Observatory and the making of solar observations at high altitudes; for repairs and alterations of buildings and grounds occupied by the Smithsonian Institution in the District of Columbia and elsewhere; and for preparation of manuscripts, drawings, and illustrations for publications.

[Note: An appropriation for the Astrophysical Observatory was first made in 1891 (26 Stat. 963). The Division of Astrophysical Research and the Division of Radiation and Organisms are both under the Astrophysical Observatory, according to the Government Organization Manual, 1957–58.]

Create a National Science Foundation

S. 247. Mr. Thomas of Utah and others, January 6, 1949 (Labor and Public Welfare). Approved May 10, 1950 (Public Law 507). (See appendix, p. 169.)
H. R. 12. Mr. Priest, January 3, 1949 (Interstate and Foreign Commerce). No action taken.
H. R. 185. Mr. Harris, January 3, 1949 (Interstate and Foreign Commerce). No action taken.
H. R. 311. Mr. Wolverton, January 3, 1949 (Interstate and Foreign Commerce). No action taken.
H. R. 359. Mr. Celler, January 3, 1949 (Interstate and Foreign Commerce). No action taken.

H. R. 1845. Mr. Van Zandt, January 25, 1949 (Interstate and Foreign Commerce). No action taken.

H. R. 2308. Mr. Mills, February 3, 1949 (Interstate and Foreign Commerce). No action taken.

H. R. 2751. Mr. Biemiller, February 15, 1949 (Interstate and Foreign Commerce). No action taken.

H. R. 4846. Mr. Priest, May 24, 1949 (Interstate and Foreign Commerce). Laid on table March 1, 1950; S. 247 passed in lieu.

H. R. 5669. Mr. Elliott, July 18, 1949 (Interstate and Foreign Commerce). No action taken.

Establishment of radio laboratory for the National Bureau of Standards

S. 443. Mr. Johnson of Colorado (by request), January 13, 1949 (Interstate and Foreign Commerce). Approved October 25, 1949 (Public Law 366). (Ch. 703, 63 Stat. 886.)

Authorizes construction and equipment of a radio laboratory building for the National Bureau of Standards at cost limit of $4,475,000.

H. R. 3180. Mr. Crosser, March 3, 1949 (Interstate and Foreign Commerce). No action taken.

Digest is same as S. 443.

Federal Scholarship Act (loan program)

H. R. 5852. Mr. Furcolo, August 2, 1949 (Education and Labor). No action taken.

Establishment of a clearinghouse for technical information in the Department of Commerce

S. 868. Mr. Johnson of Colorado (by request), February 8, 1949 (Interstate and Foreign Commerce). Approved September 9, 1950 (Public Law 776).

Establishes in the Department of Commerce a clearinghouse for the collection and dissemination of technological, scientific, and engineering information, useful to business and industry. Information of military value or significance shall be referred to the armed services.

81st Congress, 2d session

Appropriations for Arctic Institute of North America

S. 2997. Messrs. Magnuson and Bridges, February 6, 1950 (Labor and Public Welfare). No action taken.

Authorizes an annual appropriation to aid the Arctic Institute of North America in its scientific research activities.

H. R. 7161. Mr. Bartlett, February 6, 1950 (Foreign Affairs). Same as S. 2997. No action taken.

82d Congress, 1st session

No relevant items found.

82d Congress, 2d session

Federal scholarship and loan programs for advanced education

S. 3455. Messrs. Murray and Humphrey, July 2, 1952 (Labor and Public Welfare) [Student Aid Act of 1952]. No action taken. Scholarship and loan program.

H. R. 6161. Mr. Furcolo, January 22, 1952 (Education and Labor) [Federal Scholarship Act]. Loan program. No action taken.

H. R. 8523. Mr. Elliott, July 4, 1952 (Education and Labor) [Student Aid Act of 1952]. No action taken. Scholarship and loan program.

83d Congress, 1st session

Federal scholarship and loan programs for advanced education

H. R. 2838. Mr. Elliott, February 9, 1953 (Education and Labor) [Student Aid Act of 1953]. No action taken. Scholarship and loan program.

H. R. 6079. Mr. Boland, July 2, 1953 (Education and Labor) [Federal Scholarship Act]. No action taken. Loan program.

H. R. 6124. Mr. Lane, July 7, 1953 (Education and Labor) [Federal Scholarship Act]. No action taken. Loan program.

National Physical Sciences Laboratories Act

H. R. 5043. Mr. Hyde, May 6, 1953 (Interstate and Foreign Commerce). No action taken.

Bill would abolish National Bureau of Standards and transfer functions to a new establishment. (See appendix, p. 169.)

83d Congress, 2d session

Federal scholarship and loan programs for advanced education

H. R. 9965. Mr. Donohue; July 20, 1954 (Education and Labor). [Federal Scholarship Act.] No action taken. Loan program.

Federal aid to States for research

S. 2856. Mr. Smith of New Jersey; January 29, 1954 (Labor and Public Welfare). No action taken.

Authorizes the Commissioner of Education to enter into contracts or jointly financed cooperative arrangements with State educational agencies, local school systems, and public and nonprofit educational institutions and organizations for the conduct of research, surveys, and demonstrations designed to promote the cause of education throughout the country.

H. R. 7446. Mr. Rhodes of Arizona; January 21, 1954 (Education and Labor). No action taken. Same as S. 2856.

H. R. 9040. Mr. Rhodes of Arizona; May 6, 1954 (Education and Labor). Approved July 26, 1954 (Public Law 531).

Different from H. R. 7446 only in that "Commissioner of Education to enter into contracts * * * with universities, colleges, and State educational agencies, for the conduct of research * * *." Provides for advice of specialists and requires annual reports to Congress. Autnorizes necessary appropriations.

Initial appropriation for International Geophysical Year

H. R. 9936. Mr. Taber; July 16, 1954 (Appropriations). Approved August 26, 1954 (Public Law 663—Supplemental Appropriation Act, 1955). (See appendix, p. 170.)

84th Congress, 1st session

National Defense Scientific Scholarship Act

H. R. 2179. Mr. Powell; January 13, 1955 (Education and Labor). No action taken.

H. R. 6176. Mr. Powell; May 11, 1955 (Education and Labor). No action taken.

Digest of H. R. 6176 is identical with H. R. 2179 except that the date on which examinations shall be held each year was changed from "not later than June 30" to "not later than May 31." (See appendix, p. 170.)

Atomic Energy scholarships

H. R. 3695. Mr. Patterson; February 7, 1955 (Atomic Energy). No action taken. Establishes congressional research scholarships for undergraduate or graduate study in the basic sciences relating to any of the types of activities specified in section 31a of the Atomic Energy Act of 1954.

Federal scholarship and loan programs for advanced education

H. R. 33. Mr. Boland; January 5, 1955 (Education and Labor). [Federal Scholarship Act.] No action taken. Loan program.

H. R. 355. Mr. Donohue; January 5, 1955 (Education and Labor). [Federal Scholarship Act.] No action taken. Loan program.

H. R. 2211. Mr. Thompson of New Jersey; January 13, 1955 (Education and Labor). [Student Aid Act of 1955.] No action taken. Scholarship and loan program.

H. R. 5422. Mr. Elliott; March 31, 1955 (Education and Labor). [Student Aid Act of 1955.] No action taken. Scholarship and loan program.

H. R. 7846. Mr. Multer; August 2, 1955 (Education and Labor). [Federal Scholarship Act.] No action taken.

International Geophysical Year

H. R. 5240. Mr. Thomas; March 26, 1955 (Appropriations). Approved June 30, 1955 (Public Law 112—Independent Offices Appropriation Act, 1956). (See appendix, p. 170.)

84th Congress, 2d session

Extend authority of National Science Foundation

S. 3933. Mr. Magnuson; May 25, 1956 (Labor and Public Welfare). No action taken.

Bill would extend the authority of the National Science Foundation with respect to awarding scholarships and fellowships so as to permit it to award them to scientific study or scientific work on the undergraduate level (now limited to the graduate level). Increases the annual limitation on appropriations for such fellowships and scholarships to $25 million annually (now $15 million) [amending 64 Stat. 152].

Federal aid for engineering students and teachers

H. R. 11200. Mr. Holland; May 14, 1956 (Interstate and Foreign Commerce). No action taken. Scholarship program.

Provides for the training of additional engineers and the expansion of facilities for engineering education by providing supplementary salary grants for engineering teachers and scholarships and fellowships for engineering students under the National Science Foundation Act. (See appendix, p. 172.)

Federal Engineering and Science Scholarship Act

S. 3748. Mr. Clements; April 26, 1956 (Labor and Public Welfare). No action taken. Scholarship program.

Federal Engineering and Science Scholarship Act—Provides for 5,000 Federal scholarships to be awarded annually to deserving high-school students who pursue courses of study in science and engineering in college. Provides that such students be paid $100 compensation a month while pursuing such courses. Authorizes such scholarships upon the basis of competitive examinations. Requires such students who accept such scholarships to agree to render 4 years' service with the Federal Government after graduation.

Scholarships for students in science and education

H. R. 11357. Mr. Ashley; May 22, 1956 (Education and Labor). No action taken.

National Scholarship Act of 1956—Establishes a program of scholarships for students in science and education at institutions of higher education. (See appendix, p. 173.)

Federal scholarship and loan programs for advanced education

S. 2379. Mr. Payne and others; June 30, 1955 (Interstate and Foreign Commerce). Approved August 8, 1956 (Public Law 1027).

Grants the Secretary of the Interior an annual sum of $550,000 to make grants to public and nonprofit universities and colleges in the several States and Territories of the United States for educational causes of interest and benefit to the fishing industry. Makes an annual appropriation of $375,000 available to the Vocational Education Act available for vocational education in the fishery trades and industry.

S. 4208. Mr. Magnuson; July 12, 1956 (Labor and Public Welfare). [Public Health Training Act of 1956.] Scholarship program. No action taken.

H. R. 8916. Mr. Rodino; January 30, 1956 (Education and Labor). [Federal Scholarship Act.] Loan program. No action taken.

H. R. 8998. Mr. Roosevelt; February 1, 1956 (Education and Labor). [Federal Scholarship Act.] Loan program. No action taken.

H. R. 9658. Mr. Perkins; February 29, 1956 (Education and Labor). [Federal Scholarship Act.] Loan program. No action taken.

H. R. 10433. Mr. McCormack, April 11, 1956 (Merchant Marine and Fisheries). [Scholarships for professionally trained personnel in field of commercial fishing.] Laid on table July 27, 1956; S. 2379 passed in lieu.

H. R. 11096. Mr. Thompson of New Jersey, May 8, 1956 (Interstate and Foreign Commerce). [Emergency Public Health Training Act of 1956.] Grant and scholarship program. No action taken.

Certain advanced scientific research in executive departments and agencies

S. 4014. Mr. Carlson, June 7, 1956 (Post Office and Civil Service). No action taken.

Provides for the advancement of the scientific and professional research and development programs of the Departments of Defense, the Interior, and Commerce, and improves the management and administration of certain departmental activities. (See appendix, p. 171.)

H. R. 11040. Mr. Murray of Tennessee, May 7, 1956 (Post Office and Civil Service). Passed by House June 20, 1956. Digest of bill identical to S. 4014.

International Geophysical Year

H. R. 10004. Mr. Cannon; March 15, 1956 (Appropriations). Approved May 19, 1956 (Public Law 533—Second Supplemental Appropriation Act,1956). (See appendix, p. 171.)

International scientific research

S. Res. 295. Mr. Anderson; June 25, 1956 (Foreign Relations). No action taken.

Favors steps for the advancement of international scientific research.

Establishment of Commission on Increased Industrial Use of Agricultural Products

H. R. 10875. Mr. Cooley; April 27, 1956 (Agriculture). Approved May 28, 1956 (Public Law 540).

Section 209 of Public Law 540 established a bipartisan Commission on Increased Industrial Use of Agricultural Products. (See appendix, p. 171.)

85th Congress, 1st session

Establish a Science Academy

H. R. 6164. Mrs. St. George; March 19, 1957 (Education and Labor). No action taken.

Establishes in the Department of Health, Education, and Welfare an Academy to be known as the "United States Science Academy" to train selected men and women between 17 and 22 years of age as scientists and engineers for service as officers and employees of the United States. Sets out the organization of the Academy, such as the staff, the courses of instruction and training for students, etc. Provides that students at the Academy shall be entitled to receive the same pay, allowances, and emoluments as cadets at the United States Military Academy.

Establish a Nuclear Science Academy

H. R. 6571. Mr. Patterson; April 2, 1957 (Atomic Energy). No action taken.

Federal Nuclear Science Academy Act—Establishes a Federal Nuclear Science Academy to train selected persons for service as nuclear scientists with the Federal Government. Directs the Chairman of the Atomic Energy Commission to determine the location of such Academy and provide for the organization, operation, and administration of the same, including the number and

method of appointment of students. Requires each student to sign an agreement to complete the course at the Academy and serve as a Government employee for 5 years thereafter.

Joint Committee on Scientific Research

H. J. Res. 250. Mr. Judd; February 26, 1957 (Rules). No action taken.

Establishes a eight-member Joint Congressional Committee on Scientific Research. Requires the Joint Committee to collect and maintain current information on scientific research and progress in the United States, and maintain a continuous investigation and study to determine means of promoting such research and progress, etc.

Construct a geophysical institute, Hawaii

H. R. 9121. Mr. Burns of Hawaii; August 5, 1957 (Interior and Insular Affairs). No action taken.

Provides that the National Science Foundation shall construct a Geophysical Institute in the Territory of Hawaii.

Extend authority of National Science Foundation

H. R. 4218. Mr. Price; January 31, 1957 (Interstate and Foreign Commerce. No action taken.

Extends the authority of the National Science Foundation with respect to awarding scholarships so as to permit it to award them on the undergraduate level (now limited to the graduate level). Provides for $500 scholarships based on a high-school mathematics examination [Amending U. S. C. 42:1869].

Federal aid for engineering students and teachers

H. R. 2450. Mr. Holland; January 10, 1957 (Interstate and Foreign Commerce). No action taken. Grant and fellowship program.

Provides for the training of additional engineers and the expansion of facilities for engineering education by providing supplementary salary grants for engineering teachers and fellowships for engineering students under the National Science Foundation Act. (Identical with H. R. 11200, 84th Cong., 2d sess.)

S. J. Res. 48. Mr. Magnuson; February 4, 1957 (Labor and Public Welfare). No action taken. Loan program.

Sets up a program to provide an adequate number of qualified teachers and scientific, engineering, and medical personnel. (See appendix, p. 174.)

H. R. 8571. Mr. Lane; July 8, 1957 (Education and Labor). No action taken. [Federal Tuition Loan Guaranty Act].

Provides that lenders shall be insured against losses on loans made by them for tuition to science and engineering students after January 1, 1958. (See appendix, p. 174.)

National Defense Scientific Scholarship Act

H. R. 5030. Mr. Powell; February 19, 1957 (Education and Labor). No action taken. (Identical with H. R. 6176, 84th Cong., 1st sess.)

Scientific and professional scholarships in armed services

H. R. 560. Mr. Bennett of Florida; January 3, 1957 (Armed Services). No action taken.

Scientific Personnel Procurement Act—Establishes a scholarship, and a work-study program for the training and procurement of scientists, engineers, technicians, medical personnel, and other skilled persons to meet the needs of the Armed Forces. (See appendix, p. 174.)

Federal scholarship and loan programs for advanced education scholarship programs only

S. 869. Mr. Humphrey; January 25, 1957 (Labor and Public Welfare) [Student Aid Act of 1957]. No action taken.

S. 872. Mr. Humphrey; January 25, 1957 (Labor and Public Welfare) [Youth Opportunity Act]. Titles I–IV same as S. 869. No action taken.

S. 1237. Messrs. Clark and Morse; February 18, 1957 (Labor and Public Welfare) [National Scholarship Act of 1957]. No action taken.

H. R. 5642. Mr. Ashley; March 6, 1957 (Education and Labor) [National Scholarship Act of 1956]. No action taken.

H. R. 5763. Mr. Ashley; March 7, 1957 (Education and Labor) [National Scholarship Act of 1957]. No action taken.

H. R. 6212. Mr. Porter; March 20, 1957 (Education and Labor) [National Scholarship Act of 1957]. No action taken.

H. R. 8294. Mr. Flood; June 21, 1957 (Education and Labor) [National Scholarship Act of 1957]. No action taken.

H. R. 8395. Mr. McGovern; June 26, 1957 (Education and Labor). Same as H. R. 8294. No action taken.

H. R. 9506. Mr. Elliott; August 28, 1957 (Education and Labor). Same as H. R. 8294. No action taken.

Loan programs

S. 191. Mr. Langer; January 7, 1957 (Labor and Public Welfare). No action taken.

S. 1727. Mr. Javits and others; March 27, 1957 (Labor and Public Welfare) [Education Loan Act of 1957]. No action taken.

H. R. 95. Mr. Boland; January 3, 1957 (Education and Labor) [Federal Scholarship Act]. No action taken.

H. R. 390. Mr. Rodino; January 3, 1957 (Education and Labor) [Federal Scholarship Act]. No action taken.

H. R. 615. Mr. Donohue; January 3, 1957 (Education and Labor) [Federal Scholarship Act]. No action taken.

H. R. 821. Mr. Multer; January 3, 1957 (Education and Labor) [Federal Scholarship Act]. No action taken.

H. R. 1211. Mr. Poage; January 3, 1957 (Education and Labor) [College Students' Loan Act]. No action taken.

H. R. 2015. Mr. Kelley of Pennsylvania; January 5, 1957 (Education and Labor) [Scholarship Loan Insurance Act of 1957]. No action taken.

H. R. 2802. Mr. Frelinghuysen; January 14, 1957 (Education and Labor) [Student Assistance Act of 1957]. No action taken.

H. R. 3643. Mr. Perkins; January 24, 1957 (Education and Labor). Same as H. R. 615. No action taken.

H. R. 4225. Mr. Vanik; January 31, 1957 (Education and Labor) [Federal Scholarship Loan Act]. No action taken.

H. R. 4490. Mr. Addonizio; February 6, 1957 (Education and Labor). Same as H. R. 95. No action taken.
H. R. 5247. Mr. Teller; February 22, 1957 (Education and Labor). Same as H. R. 4225. No action taken.
H. R. 5252. Mr. Teller; February 22, 1957 (Education and Labor). Same as H. R. 95. No action taken.
H. R. 9413. Mr. Reuss; August 22, 1957 (Education and Labor) [National Scholarship Loan Act]. No action taken.

Scholarship and loan programs

H. R. 620. Mr. Elliott; January 3, 1957 (Education and Labor) [Student Aid Act of 1957]. No action taken.
H. R. 4439. Mr. Thompson of New Jersey; February 5, 1957 (Education and Labor). Same as H. R. 620. No action taken.
H. R. 4598. Mr. Roosevelt; February 7, 1957 (Education and Labor) [Student Aid Act of 1957]. No action taken.
H. R. 9577. Mr. Elliott; August 30, 1957 (Education and Labor) [Student Aid Act of 1957]. No action taken.

Responsibility for coordination of technical information concerning air traffic control and air defense systems applicable to civil and military action

S. 1856. Messrs. Magnuson, Bricker, and Schoeppel; April 12, 1957 (Interstate and Foreign Commerce). Approved August 14, 1957 (Public Law 85–133). (See appendix, p. 173.)

85th Congress, 2d Session

(to March 1, 1958)

Federal Department of Science, creation of

S. 3126. Messrs. Humphrey, McClellan, and Yarborough; January 27, 1958 (Government Operations). No action taken.
Science and Technology Act of 1958.
S. 3180. Mr. Kefauver; January 28, 1958 (Government Operations). No action taken.
Department of Science Act of 1958.

National Science Council, creation of

H. R. 9611. Mr. McCormack; January 7, 1958 (Armed Services). No action taken.
H. R. 10208. Mr. Riehlman; January 22, 1958 (Armed Services). No action taken.
H. R. 10439. Mr. Harvey; February 3, 1958 (Armed Services). No action taken.

Science Academy, creation of

S. 2957. Mr. Thurmond; January 9, 1958 (Labor and Public Welfare). No action taken.
United States Science Academy Act.
S. 2967. Mr. Gore; January 13, 1958 (Labor and Public Welfare). No action taken.
Science Training Act; establishes a National Science Academy; provides for scholarships for scientific study.

S. 3110. Mr. Potter; January 23, 1958 (Armed Services). No action taken.

Establishes a 9-member Commission on the Establishment of a United States Academy of Science.

S. 3111. Mr. Jenner; January 23, 1958 (Armed Services). No action taken.

United States Science Academy Act.

H. R. 9610. Mr. Anfuso; January 7, 1958 (Armed Services). No action taken.

United States Science Academy Act.

H. R. 9672. Mrs. Kee; January 7, 1958 (Armed Services). No action taken.

United States Academy of Science Act.

H. R. 9685. Mr. Long; January 7, 1958 (Armed Services). No action taken.

United States Science Academy Act.

H. R. 9712. Mrs. Rogers of Massachusetts; January 7, 1958 (Armed Services). No action taken.

Armed Forces Science Academy Act.

H. R. 9902. Mr. Boggs; January 13, 1958 (Armed Services). No action taken.

Same as H. R. 9672; United States Academy of Science Act.

H. R. 10067. Mr. Rodino; January 16, 1958 (Education and Labor). No action taken.

United States Science Academy Act.

H. R. 10159. Mr. Griffin; January 21, 1958 (Armed Services). No action taken.

Establishes a Commission on the Establishment of a United States Academy of Science.

H. R. 10224. Mr. Adair; January 23, 1958 (Armed Services). No action taken.

Establishes a United States Academy of Science and Technology within the Department of Defense.

H. R. 10229. Mr. Broomfield; January 23, 1958 (Armed Services). No action taken.

Same as H. R. 10159; establishes a Commission on the Establishment of a United States Academy of Science.

H. R. 10635. Mr. Radwan; February 10, 1958 (Armed Services). No action taken.

United States Science Academy Act.

H. R. 10931. Mrs. St. George; February 24, 1958 (Armed Services). No action taken.

Establishes a United States Science Academy in the Department of Defense.

H. R. 10933. Mr. Utt; February 24, 1958 (Armed Services). No action taken.

United States Science Academy Act.

H. J. Res. 503. Mr. Kean; January 16, 1958 (Armed Services). No action taken.

Federal Science Academy Act.

Astronautics and control of outer space

S. 3117. Mr. Anderson; January 23, 1958 (Atomic Energy). No action taken.

Outer Space Development Amendment of 1958.

S. 3233. Mr. Yarborough and others; February 5, 1958 (Interstate and Foreign Commerce). No action taken.
The Space Act of 1958.

H. R. 9847. Mr. Lane; January 8, 1958 (Armed Services). No action taken.
Establishes a Commission on Outer Space.

H. R. 9966. Mr. Coad; January 14, 1958 (Armed Services). No action taken.
Astronautics Act of 1958.

H. R. 10271. Mr. Durham; January 27, 1958 (Atomic Energy). No action taken.
Outer Space Development Amendment of 1958.

H. R. 10352. Mr. Holifield; January 29, 1958 (Atomic Energy). No action taken.
Outer Space Development Amendment of 1958.

Meteorological Research

S. 3294. Mr. Magnuson (by request); February 17, 1958 (Interstate and Foreign Commerce). No action taken.
Authorizes research in meteorology.

H. R. 10720. Mr. Wolverton; February 13, 1958 (Interstate and Foreign Commerce). No action taken.
Authorizes research in meteorology.

Department of Treasury; establishment of National Scientific Research Reserve Fund

H. R. 10293. Mr. Dawson of Illinois; January 27, 1958 (Interstate and Foreign Commerce). No action taken.

Department of Defense; creation of Supply and Research Department

H. R. 10270. Mr. Dingell; January 27, 1958 (Armed Services). No action taken.

National Science Foundation, authority extended

S. 3268. Mr. Hill and Mr. Smith of New Jersey; February 13, 1958 (Labor and Public Welfare). No action taken.
Authority of NSF with particular reference to scholarships extended.

Scientific and Technical Information

S. 3313. Mr. Humphrey; February 19, 1958 (Foreign Relations). No action taken.
NSF to establish programs outside the United States for collection and processing of technical scientific information.

H. R. 9827. Mr. Hillings; January 8, 1958 (House Administration). No action taken.
Establish in Library of Congress a Scientific Journal Translation Bureau.

Congressional committees, etc.

S. Con. Res. 53. Mr. Javits; January 9, 1958 (Armed Services). No action taken.
Establishes a Joint Committee on Earth Satellites and the Problems of Outer Space.

S. Res. 256. Mr. Johnson of Texas, and others; February 5, 1958 (Rules and Administration). Passed by Senate February 6, 1958.
Establishes a Special Committee on Astronautics and Space Exploration.

H. R. 9613. Mr. Brooks of Louisiana; January 7, 1958 (Rules). No action taken.
Establishes a Joint Committee on Problems Relating to the Navigation, Use, and Control of Outer Space.

H. R. 9619. Mr. Auchincloss; January 7, 1958 (Rules). No action taken.
Congressional Scientific Achievement Awards Act.

H. R. 9668. Mr. Keating; January 7, 1958 (Rules). No action taken.
Establishes a Joint Committee To Study the Use and Control of Outer Space.

H. R. 9901. Mr. Boggs; January 13, 1958 (Rules). No action taken.
Establishes a Joint Committee To Study the Use and Control of Outer Space.

H. R. 9929. Mr. Rogers of Florida; January 13, 1958 (Interstate and Foreign Commerce). No action taken.
Distinguished Scientific Achievements Act of 1958.

H. J. Res. 489. Mr. Fulton; January 9, 1958 (Rules). No action taken.
Establishes a Joint Committee on Earth Satellites and the Problems of Outer Space.

H. Con. Res. 258. Mr. Hillings; February 4, 1958 (Rules). No action taken.
Establishes an Emergency Joint Congressional Committee To Investigate Control of Airspace of United States.

H. Con. Res. 265. Mr. Keating; February 10, 1958 (Foreign Affairs). No action taken.
United States to assume leadership in efforts toward agreement on use of outer space for peaceful purposes.

H. Con. Res. 268. Mr. Hillings; February 24, 1958 (Foreign Affairs). No action taken.
Same as H. Con. Res. 265.

H. Res. 433. Mr. Frelinghuysen; January 14, 1958 (Rules). No action taken.
Create a select committee to investigate government science programs and policies.

H. Res. 473. Mr. Coad; February 6, 1958 (Rules). No action taken.
Establishes a Special Committee on Astronautics and Space Exploration.

H. Res. 474. Mr. Brooks of Louisiana; February 10, 1958 (Rules). No action taken.
Establishes a Special Committee on Astronautics and Space Exploration.

Students, Federal aid

S. 2917. Mr. Thye; January 9, 1958 (Labor and Public Welfare). No action taken.
National Scholarship Act.

S. 2956. Messrs. Monroney, Kerr, and McNamara; January 9, 1958 (Labor and Public Welfare). No action taken.
Aid to science education of less than college grade, essential to vocational education.

S. 2967. Mr. Gore; January 13, 1958 (Labor and Public Welfare). No action taken.
Science Training Act.

S. 3119. Mr. Mansfield; January 23, 1958 (Labor and Public Welfare). No action taken.
Scholarships and fellowships for scientific study or scientific work.

S. 3157. Messrs. Flanders and Bricker; January 27, 1958 (Labor and Public Welfare). No action taken.
National Scholarship Act of 1958.

S. 3163. Mr. Smith and others; January 28, 1958 (Labor and Public Welfare). No action taken.
Educational Development Act.

S. 3187. Mr. Hill and others; January 30, 1958 (Labor and Public Welfare). No action taken.
National Defense Education Act of 1958.

S. 3352. Messrs. Flanders and Cooper; February 25, 1958 (Labor and Public Welfare). No action taken.
Grants for improvement of science and mathematics instruction in high schools.

H. R. 9635. Mr. Brooks of Texas; January 7, 1958 (Education and Labor). No action taken.
National Science Scholarship Act of 1958.

H. R. 9692. Mr. Martin; January 7, 1958 (Education and Labor). No action taken.
Scholarship program in science and technology.

H. R. 9725. Mr. Sieminski; January 7, 1958 (Education and Labor). No action taken.
Scholarships in fields of science.

H. R. 9905. Mr. Dingell; January 13, 1958 (Armed Services). No action taken.
Authorizes Secretary of Defense to award scholarships and graduate fellowships for scientific study or work.

H. R. 9918. Mr. Long; January 13, 1958 (Interstate and Foreign Commerce). No action taken.
Financial assistance to science students.

H. R. 9939. Mr. Wright; January 13, 1958 (Education and Labor). No action taken.
Aid to scientific education in secondary schools and rural areas.

H. R. 10068. Mr. Rodino; January 16, 1958 (Education and Labor). No action taken.
Federal Science Scholarship Act.

H. R. 10180. Mr. Sikes; January 21, 1958 (Interstate and Foreign Commerce). No action taken.
National Science Foundation Act of 1950; training of additional engineers and scientists.

H. R. 10381. Mr. Elliott; January 30, 1958 (Education and Labor).
National Defense Education Act of 1958.

H. R. 10454. Mr. O'Konski; February 3, 1958 (Education and Labor). No action taken.
National Defense Scientific Scholarship Assistance Act.

H. R. 10456. Mr. Price; February 3, 1958 (Interstate and Foreign Commerce). No action taken.
Scholarships in science and mathematics.

H. R. 10464. Mr. Van Zandt; February 3, 1958 (Interstate and Foreign Commerce).

Same as H. R. 10456; scholarships in science and mathematics.

H. R. 10768. Mr. Perkins; February 17, 1958 (Education and Labor). No action taken.

Same as H. R. 10381, National Defense Education Act of 1958 (Mr. Hill).

Teachers, Federal aid

S. 2916. Mr. Thye, January 9, 1958 (Labor and Public Welfare). No action taken.

Federal aid to States for science teachers and equipment in secondary schools.

S. 3156. Messrs. Flanders and Bricker; January 27, 1958 (Labor and Public Welfare). No action taken.

Advanced education of teachers in science.

Importation of scientific equipment

S. 3155. Mr. Flanders; January 27, 1958 (Finance). No action taken.

Duty-free importation of scientific equipment by tax-exempt educational organizations.

APPENDIX A

Digest of Relevant Bills

S. 1248, 79th Congress, 1st session
H. R. 5332, 79th Congress, 2d session
H. R. 6118, 79th Congress, 2d session
S. 493, 80th Congress, 1st session
S. 526, 80th Congress, 1st session
S. 247, 81st Congress, 1st session
H. R. 5043, 83d Congress, 1st session
H. R. 9936, 83d Congress, 2d session
H. R. 5240, 84th Congress, 1st session
H. R. 6176, 84th Congress, 1st session
S. 4014, 84th Congress, 2d session
H. R. 10004, 84th Congress, 2d session
H. R. 10875, 84th Congress, 2d session
H. R. 11200, 84th Congress, 2d session
H. R. 11357, 84th Congress, 2d session
S. 1856, 85th Congress, 1st session
S. J. Res. 48, 85th Congress, 1st session
H. R. 560, 85th Congress, 1st session
H. R. 8571, 85th Congress, 1st session

79th Congress, 1st session

S. 1248. Mr. Fulbright; July 9, 1945 (Commerce). No action taken

Creates within the Department of Commerce a Bureau of Scientific Research to which are transferred the National Investors Council and the Office of Production Research and Development of the War Production Board. The Bureau shall examine and record all inventions, products, and scientific processes submitted to it, and shall, in certain cases provide for their development. Awards shall be made, and pertinent information collected and published. Inventions, scientific processes, etc., submitted (all private patent rights automatically waived) shall, if found practicable, be patented by the United States, whereupon the United States may grant a license for their use. The licensee shall pay not more than 4 percent of the gross income as royalty, and not less than 50 percent of this amount shall be paid the person who submitted the invention or scientific process. All applications for patents, and all questions of litigation, in which the United States has an interest shall be handled by the Department of Justice.

79th Congress, 2d session

H. R. 5332. Mrs. Luce; February 1, 1946 (Expenditures in the Executive Departments). No action taken

Creates in the executive department a Department of Science and Research to promote the study and spread of scientific knowledge and its practical application, and to correlate on the highest governmental level the programs of national defense, national health, and proper conservation and use of the production and natural resources of the Nation. There shall be a Secretary of Science and Research appointed by the President with the consent of the Senate, and five

Assistant Secretaries of Science and Research, charged with the duties, respectively, of a Bureau of Physics and Mathematical Science, a Bureau of Public Health and Social Science, a Bureau of Scientific Education and Information, a Bureau of the Biological Sciences, and a Bureau of Engineering and Technological Sciences; and there shall be an advisory council consisting of not less than 100 members, representative of all branches of science. Within 1 year from the passage of the act, the Secretary, each Assistant Secretary, the Adivsory Council, and Committees of the Council shall issue separate reports to the President and the Congress, with recommendations.

79th Congress, 2d session

H. R. 6118, Mr. Priest; April 13, 1946 (Interstate and Foreign Commerce). No action taken

The Technological Research and Development Act.—Creates within the Department of Commerce an Office of Technical Services. Transfers to the Secretary of Commerce the functions and personnel of the National Inventors Council, the Technical Advisory Service of the Smaller War Plants Corporation, and the Office of Production, Research, and Development of the Civilian Production Agency. The Secretary's duties under the act shall be: To examine and record all inventions, products, and scientific processes submitted to the office, disseminate scientific and technical information, advise on specific technical and scientific problems of business and industry, conduct research for business firms on a reasonable cost basis, and in certain cases provide for their development. Inventions, scientific processes, etc., may be submitted for analysis of its possibilities at a fee of $10; a public recording will be made at this time. Loans of $1,500 may be made on any practical and beneficial idea for further development of an invention or process. A further loan of $300 may be made to defray costs of a patent. No further development of a likely invention shall be undertaken unless the owner will: (1) license to the United States the use of such; (2) grant nonexclusive licenses to any applicants therefor bearing reasonable royalties; (3) allow the Secretary to fix royalties in case of dispute; and (4) repay one-half of the royalties to the United States until amount loaned has been repaid. Government-owned patents shall be made available to private business.

80th Congress, 1st session

S. 493. Messrs. Fulbright and Aiken; February 5, 1947 (Expenditures in the Executive Departments). Reported in Senate June 27, 1947

Technical Information and Services Act.—The Secretary of Commerce shall: (1) keep a record of all inventions, products, and scientific or technical processes or information submitted to him; (2) to acquire, in collaboration with other agencies, data regarding inventions, etc., including reports and documents from enemy or other foreign sources, results of research sponsored by the Federal Government, and information voluntarily made available by private industry or State or local public authorities; (3) within the limits of his authority remove restrictions on the dissemination of scientific and technical data where interests of national security do not prevent their removal; and (4) to catalog, edit, abstract, translate, index, and classify all technical information he acquires, and publish and disseminate to industry, business, State and local governments, and the general public, nonconfidential information.

Through the National Bureau of Standards or other facilities, the Secretary shall undertake engineering or technological research on industrial, commercial, or related problems of an important general nature and shall initiate and sponsor research and development in such problems by public departments and agencies or by private institutions and persons, and he may finance the research or development. He shall provide technical aids and services to industry and business, particularly small enterprise, and to State and local governments; shall provide inventors and technologists with basic information concerning the protection, financing and marketing of inventions, etc., and shall assist businessmen by collecting information on technical problems, and by bringing such problems to the attention of inventors, scientists, and research institutions.

The Secretary shall not commit public funds for research or development unless he finds that the project is likely to lower costs of production, increase efficiency, or promote the establishment or expansion of industries in and that it is unlikely the objectives of such project will be achieved within a reasonable time by private enterprise acting without such aid, or by any other Government agency. Any

arrangement providing for a commitment of public funds (1) shall include an agreement that the Government, if the project proves commercially profitable, will receive a return of at least its share of the cost; (2) shall contain provisions which will secure to the Government the continued use, free of charge, of any invention, etc., resulting from the project; and (3) shall conform to Federal laws relating to Government patents or to Government research or development.

Inventions, products, or scientific processes may be filed with the Secretary.

The Secretary shall refer to the armed services all inventions, etc., of military value or significance, and shall refer to the heads of other Government agencies scientific and/technical information relating to their activities.

The Secretary may appoint an advisory committee or committees to consult and advise on the administration of this act.

80th Congress, 1st session

S. 526. Mr. Smith and others; February 7, 1947 (Labor and Public Welfare). Vetoed August 6, 1947

National Science Foundation Act of 1947.—Establishes as an independent Government agency the National Science Foundation to: (1) develop and encourage a national policy for scientific research and scientific education; (2) initiate and support basic scientific research in the mathematical, physical, medical, biological, engineering, and other sciences, by making contracts or other arrangements (including grants, loans, and other forms of assistance) for the conduct of such research; (3) by similar means initiate and support scientific research on matters relating to the national defense; (4) grant scholarships and graduate fellowships; (5) foster the international exchange of scientific information; and (6) correlate the Foundation's programs with those of individuals and public and private research groups.

The Foundation shall have 48 members appointed by the President with the consent of the Senate, for an 8-year term, from among leaders in the fields of fundamental sciences, medical science, engineering, education, or public affairs. Biennially the Foundation shall elect from its own membership an executive committee of 9 members which shall meet at least 6 times each year. The executive committee shall appoint a Director of the Foundation at $15,000 per year.

Within the Foundation there shall be a division of national defense and such other divisions as the Foundation may deem necessary, but unless the Foundation provides otherwise, there shall be Divisions of Medical Research, Mathematical, Physical, and Engineering Sciences, Biological Sciences, National Defense, and Scientific Personnel and Education, with a committee for each division composed of not less than 5 persons appointed by the Foundation, except that for a division of national defense, there shall be a committee with not less than 8 nor more than 40 members in a multiple of 4, one-half of the number to be civilians appointed by the Foundation and the remaining half representatives for the War and Navy Departments. Within the Committee for the Division of National Defense there shall be an executive committee of 5 members, consisting of the chairman of the divisional committee, 2 civilian members, and 1 member each representing the War and the Navy Departments. The Committee for the Division of National Defense shall establish regulations for the security classification and the safeguarding of information or property in connection with research having military significance.

The Foundation may award scholarships and graduate fellowships for scientific study or work at accredited nonprofit American or foreign institutions of higher education, solely on the basis of ability.

The Foundation shall maintain a register of scientific and technical personnel, but no person shall be listed therein without his consent.

Every contract or other arrangement executed by the Foundation relative to scientific research shall contain provisions governing the disposition of inventions produced thereunder which will protect the public interest and the equities of the individual party to the contract. All inventions produced by employees of the Foundation in the course of their assigned activities for the Foundation shall be freely available to the public, or, if patented, shall be freely dedicated to the public.

The Foundation may, with the approval of the President cooperate in any international scientific research activities consistent with the purposes of this act.

Necessary sums are authorized. The Foundation shall not, itself, operate laboratories or pilot plants.

An Interdepartmental Committee on Science to consist of the Director of the Foundation as Chairman, and representatives of Government agencies concerned with the support of scientific activity, is established and shall meet not less than

once a month. It shall gather and correlate data relating to scientific research and development activities of the Federal Government and make recommendations to the President.

The Director may, with the approval of the executive committee, appoint a Deputy Director at not more than $12,000 a year.

The Office of Scientific Research and Development is abolished.

81st Congress, 1st session

S. 247. Mr. Thomas of Utah and others; January 6, 1949 (Labor and Public Welfare). Approved May 10, 1950. (Public Law 507)

National Science Foundation Act of 1949.—Establishes as an independent Government agency the National Science Foundation to: (1) Develop and encourage the pursuit of a national policy for basic research and education in the sciences; (2) initiate and support basic scientific research in the mathematical, physical, medical, biological, engineering, and other sciences, by making contracts or other arrangements (including grants, loans, and other forms of assistance) for the conduct of such research; (3) by similar means (after consultation with the Secretary of Defense) initiate and support scientific research on matters relating to the national defense; (4) grant scholarships and graduate fellowships in the mathematical, physical, medical, biological, engineering, and other sciences; (5) foster the international exchange of scientific information; (6) correlate the Foundation's programs with those undertaken by individuals and by public and private research groups; and (7) establish special commissions as it may deem necessary. The Foundation shall endeavor to strengthen the work throughout the United States and avoid undue concentration.

The Foundation shall have 24 members appointed by the President with the consent of the Senate, for a 6-year term, who are eminent in the fields of the basic sciences, medical science, engineering, education, or public affairs; an Executive Committee and such other committees as are necessary may be appointed from among its membership. The President with the consent of the Senate shall appoint a director of the Foundation for a term of 6 years, at $15,000 per year.

Unless the Foundation provides otherwise, there shall be divisions of medical research, mathematical, physical, and engineering sciences, biological sciences, and scientific personnel and education, with a committee for each division composed of not less than five persons appointed by the Foundation.

The Foundation may award scholarships and graduate fellowships for scientific study or work at accredited nonprofit American or foreign institutions of higher education, solely on the basis of ability. It shall maintain a register of scientific and technical personnel.

Every contract or other arrangement executed by the Foundation relative to scientific research shall contain provisions governing the disposition of inventions produced thereunder which will protect the public interest and the equities of the individual party to the contract. No officer or employee of the Foundation shall acquire, retain, or transfer any rights, under the patent laws of the United States, in any invention which he may make or produce in connection with his assigned activities.

The Foundation may, consistent with the foreign policy objectives of the United States as determined by the Secretary of State after consultation with the Director, cooperate in any international scientific research activities consistent with the purposes of this act.

Necessary sums are authorized. The Foundation shall not, itself, operate laboratories or pilot plants, nor shall it support any research or development activity in the field of atomic energy or acquire or dispose of property resulting from research in that field without the concurrency of the Atomic Energy Commission that the common defense will not be adversely affected thereby.

The Director may, with the approval of the Foundation, appoint a Deputy Director at not more than $12,000 a year.

83d Congress, 1st session

H. R. 5043. Mr. Hyde; May 6, 1953 (Interstate and Foreign Commerce). No action taken

National Physical Sciences Laboratories Act.—Establishes the National Physical Sciences Laboratories, composed of an 18-member Governing Board appointed by the President, 7 of which shall be selected from private life, the remainder consisting of governmental agency representatives, the former to serve for 6 years, all to serve without compensation, as an executive agency.

Provides for the appointment of a Director by the President, with the advice and consent of the Senate, who may appoint a Deputy Director and Associate Directors, whose compensation rate shall be that of 18 under the general schedule of the Classification Act of 1949, and other necessary personnel, not more than 24 of whom shall be placed in grade 17 under the general schedule.

Authorizes the Director to undertake (1) national standards of measurement in fields of scientific investigations, engineering, manufacturing, commerce, and education, (2) determinations of physical constants and properties of materials of scientific or manufacturing interest, (3) development of methods of material, mechanism, and structure testing, (4) establishment of standard practices for codification, (5) advisory service to Government agencies on scientific and technical problems, (6) invention and development of devices to serve special needs of Government, together with other specified activities incidental or similar to the above enumerated.

Repeals the act establishing a National Bureau of Standards and transfers the functions thereof to the agency created hereunder [repealing U. S. C. 15, ch. 7].

83d Congress, 2d session

H. R. 9936. Mr. Taber; July 16, 1954 (Appropriations). Approved August 26, 1954 (Public Law 663—Supplemental Appropriations Act, 1955)

[Excerpt of Public Law 663 concerning the International Geophysical year]

NATIONAL SCIENCE FOUNDATION

International Geophysical year.—For necessary expenses to carry out the purposes of the National Science Foundation Act of 1950, as amended (42 U. S. C. 1861–1875), as they pertain to the United States program for the International Geophysical year, $2 million, to remain available until expended.

84th Congress, 1st session

H. R. 5240. Mr. Thomas: March 26, 1955 (Appropriations). Approved June 30, 1955 (Public Law 112)

[Excerpt of Public Law 112 concerning the International Geophysical Year]

NATIONAL SCIENCE FOUNDATION

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International Geophysical year: For necessary expenses to carry out the purposes of the National Science Foundation Act of 1950, as amended (42 U. S. C. 1861–1875), as they pertain to the United States program for the International Geophysical Year, including expenses of travel notwithstanding any limitation contained in this Act, $10,000,000, to remain available until June 30, 1960.

84th Congress, 1st session

H. R. 6176. Mr. Powell; May 11, 1955 (Education and Labor). No action taken

National Defense Scientific Education Act Authorizes the Commissioner of Education to grant scholarships for study, at the college or graduate level, of subjects in the fields of engineering, physics, chemistry, or similar scientific courses, in order to increase the supply of trained scientific and technical personnel in the United States. Stipulates, that with respect to such scholarships; (1) applicants must have completed at least 11 years of education; (2) examinations shall be given in each State and the District of Columbia not later than May 31 of each year; (3) awards shall be made on the basis of competitive examinations under standards established by the Commissioner; (4) no individuals shall be discriminated against on account of race, religion, color, sex, national origin, ancestry, or failure to obtain such scholarship in a prior year; (5) the Commissioner shall approve the educational institutions which individuals holding scholarships may attend; (6) scholarships are limited to $2,000 for any individual in any academic year; and (7) scholarships are awarded for 1 year but may be renewed by the Commissioner.

Directs the Commissioner to transmit a list of the eligibles to Members of Congress, each Member to receive names of residents of his State. Authorizes each Member to select the names of 50 eligibles which he represents back to the Commissioner, each of which shall then be entitled to receive a scholarship to be

known as national defense scientific scholarships. Defers scholarship holders from military service for the duration of the scholarship.

Establishes a 12-member Commission on National Defense Scientific Scholarships, (1) 8 members of which shall be appointed by the President (*a*) 1 from the Atomic Energy Commission, (*b*) 1 from the National Science Foundation, and (*c*) 6 from private life, (2) 2 to be appointed by the President of the Senate from the membership of the Senate, and (3) 2 to be appointed by the Speaker of the House from the membership thereof. Compensates the members selected from private life at $50 per diem while engaged in official duties. Directs the Commission to advise and consult with the Commissioner with respect to the duties vested in him under the provisions hereof.

84th Congress, 2d session

S. 4014. Mr. Carlson; June 7, 1956 (Post Office and Civil Service). No action taken

Provides for the advancement of the scientific and professional research and development programs of the Departments of Defense, the Interior, and Commerce, and improves the management and administration of certain departmental activities. Fixes the maximum number of personnel in professional and scientific positions to (1) 275 positions in the Department of Defense, (2) 50 positions in the National Security Agency, (3) 60 positions for headquarters and research stations of the National Advisory Committee for Aeronautics, (4) 10 positions in the Department of the Interior, and (5) 35 positions in the Department of Commerce.

Requires the heads of such departments to submit to the Congress, not later than February 1 of each year, a report with respect to the positions established by him under this act which sets forth (1) the number of such positions so established or in existence during the immediate preceding calendar year, (2) such other information as they deem appropriate. Permits such officers to make omissions in such reports where full public disclosure would be detrimental to the national security or the public interest. Directs the Civil Service Commission to report annually to the Congress the total number of positions established under these provisions for grades 16, 17, and 18 of the general schedule and the total number of positions so established for each such grade. Makes various technical amendments.

84th Congress, 2d session

H. R. 10004. Mr. Cannon; March 15, 1956 (Appropriations). Approved May 19, 1956 (Public Law 533—Second Supplemental Appropriation Act, 1956)

[Excerpt of Public Law 533 concerning the International Geophysical Year]

NATIONAL SCIENCE FOUNDATION

International Geophysical year: For an additional amount for "International Geophysical Year," $27,000,000, to remain available until June 30, 1960.

84th Congress, 2d session

H. R. 10875. Mr. Cooley; April 27, 1956 (Agriculture). Approved May 28, 1956 (Public Law 540)

[EXCERPT]

SEC. 209. (a) (1) There is hereby established a bipartisan Commission on Increased Industrial Use of Agricultural Products (hereafter referred to as "the Commission"). The Commission shall be composed of five members, of whom not more than three shall be members of the same political party, to be appointed by the President by and with the advice and consent of the Senate. In making such appointments the President shall give due consideration to the interests of various segments of agriculture. One of the members so appointed shall be designated as Chairman by the President.

(2) Members of the Commission shall be paid compensation at the rate of $50 per day and shall be reimbursed for necessary traveling and other expenses incurred by them in the performance of their duties as members of the Commission.

(3) The Commission is authorized to appoint and fix the compensation, without regard to the civil-service laws and the Classification Act of 1949, as amended, of an executive director and such chemists, engineers, agriculturists, attorneys, and other assistants as it may deem necessary. The Secretary of Agriculture is authorized to provide the Commission with necessary office space, and may detail,

on a reimbursable basis, any personnel of the Department of Agriculture to assist the Commission in carrying out its work.

(4) Upon request of the Commission, any other department or agency of the Government having information or data needed by the Commission in carrying out its duties under this section, shall make such information or data available to the Commission for such purposes. The Commission shall take such steps as may be necessary to protect against unauthorized disclosure any such information or data which may be classified for security purposes.

(5) Service of an individual as a member of the Commission or employment of an individual by the Commission in a technical or professional field, on a part-time or full-time basis, shall not be considered as service or employment bringing such individual within the provisions of section 281, 283, 284, 434, or 1914 of title 18 of the United States Code, or section 190 of the Revised Statutes (5 U. S. C. 99).

(b) It shall be the duty of the Commission to prepare and present to the Congress, not later than June 15, 1957, the necessary recommendations which in its opinion will bring about the greatest practical use for industrial purposes of agricultural products not needed for human or animal consumption, including, but not limited to, use in the manufacture of rubber, industrial alcohol, motor fuels, plastics, and other products.

(c) There is hereby authorized to be appropriated such sum, not to exceed $150,000, as may be necessary to enable the Commission to carry out its functions.

(d) Upon submission of the recommendations referred to in subsection (b), the Commission shall cease to exist.

84th Congress, 2d session

H. R. 11200. Mr. Holland; May 14, 1956 (Interstate and Foreign Commerce). No action taken

Provides for the training of additional engineers and the expansion of facilities for engineering education by providing supplementary salary grants for engineering teachers and scholarships and fellowships for engineering students under the National Science Foundation Act. Defines various terms for the purposes of this title such as "engineering teacher" shall mean any individual teaching an engineering course, whether at the secondary, undergraduate, or postgraduate level.

Grants supplementary salary payments to engineering teachers at approved schools of engineering to bring their total income up to the level of income generally received by engineers of comparable qualifications in private industry. Requires such schools of engineering to enter into the following written agreements with the Foundation before any such payments may be made to them: (1) That the regular salaries of such teachers shall not be reduced; (2) that it will keep the Foundation currently informed with respect to the salary regularly payable to all engineering teachers on its faculty; and (3) such other information and assurances as the Foundation may require.

Encourages exceptionally qualified high school graduates with special interest and ability in the field of engineering to pursue their education in such field at the college level, by awarding them scholarships to pay the expenses incident to the attainment of a baccalaureate degree in engineering. Directs the Foundation to provide for the holding of annual competitive examinations in each congressional district to determine the individuals who will be awarded scholarships from that district. Sets out further requirements for such scholarships. Grants 30 scholarships for each congressional district. If there are not 30 recipients in a particular district, then the balance of such awards shall be made to qualified persons in other congressional districts.

Provides that the balance of any scholarships shall be awarded under regulations to be prescribed by the Foundation, to individuals already attending approved schools of engineering who are in the upper 10 percent of their classes at such schools and who will continue under such scholarships to pursue their engineering courses.

Provides that an individual awarded a scholarship under these provisions may pursue his engineering course under such scholarship at any approved school of engineering in the United States which agrees to admit him and to accept the payments made on his behalf in lieu of the tuition and other charges customarily imposed. Declares that the Foundation shall pay to each approved school of engineering for each student attending under such scholarship, of educating such student, and providing facilities (other than meals and lodging) in connection therewith. Provides that the Foundation shall pay directly to each holder of a

scholarship an allowance of $100 a month for each month during any part of which he is actually attending school under such scholarship to pay the living expenses of such individual (including his meals and lodging and any supplies, books, equipment, and other items which are reasonably necessary to his engineering education and which are not made available to him without charge by the school). Sets out the procedure for administering such entitlement.

Increases the number of engineering teachers at secondary schools, while encouraging graduates of approved schools of engineering to pursue postgraduate engineering courses, by awarding fellowships to such graduates on condition that they devote a period of time (during which they will be paid supplementary salary grants) to the teaching of engineering courses in secondary schools. Provides for the awarding of such fellowships; sets out the terms of the agreements by fellow applicants, and provides for payments to approved schools for such fellowships. Authorizes necessary appropriations for each fiscal year.

84th Congress, 2d session

H. R. 11357. Mr. Ashley; May 22, 1956 (Education and Labor). No action taken

National Scholarship Act of 1956: Establishes a program of scholarships for students in science and education at institutions of higher education. Establishes within the Department of Health, Education, and Welfare a Director of Scholarships. The Director shall administer the provisions of this act and perform such other duties involving Federal scholarships, fellowships, and similar matters as the Secretary may prescribe. Declares that the Director shall provide for the holding of annual competitive examinations in the fields of education and science to assist him in determining the individuals who will be awarded undergraduate scholarships under this act. Provides that individuals desiring to compete in such examinations shall make written application therefor in such manner and form as the Director shall prescribe.

Provides that no individual shall be eligible to compete in any such examination unless he will have completed his secondary education (or the recognized equivalent thereof) in time to begin his education under a scholarship at the fall term in the year in which the examination is held, and no individual shall be eligible to compete in any such examination if he has already begun his education at an institution of higher education at the time the examination is held. Declares that 50,000 undergraduate scholarships shall be awarded in the field of education and 20,000 undergraduate scholarships shall be awarded in the field of science. The number of undergraduate scholarships awarded under these provisions to residents of any State shall bear the same ratio to the total number of scholarships available in that field for that year as the number of high-school graduates in that State for the preceding calendar year bears to the total number of high-school graduates in all the States for such preceding calendar year.

Permits the Director to award annually 5,000 postgraduate scholarships. Permits an individual awarded an undergraduate scholarship to pursue his course of study at any college or university which admits him as a candidate for baccalaureate degree. Provides that an individual awarded a postgraduate scholarship may pursue his course of study at any institution of higher education, within or outside the United States which admits him as a candidate for one or more postgraduate degrees in science. Provides that the Director shall pay directly to any institution the amount of regular tuition for a person pursuing a course of education under such undergraduate scholarship and directly to the individual in the case of a postgraduate scholarship. Provides that the Director shall pay directly to the individual $90 a month under both scholarships for books, fees, etc.

85th Congress, 1st session

S. 1856. Messrs. Magnuson, Bricker, and Schoeppel; April 12, 1957 (Interstate and Foreign Commerce). Approved August 14, 1957 (Public Law 85–133)

DIGEST OF BILL

Airways Modernization Act of 1957: Establishes the Airways Modernization Board to consist of three members with the Chairman to be appointed by the President and the other two members to be the Secretary of Defense and Secretary of Commerce. Directs the Board to develop, modify, test, and evaluate systems, procedures, facilities, and devices to meet the needs for safe and efficient navigation and traffic control of all civil and military aviation. Excepts from the act the needs of military agencies which are peculiar to air warfare and primarily

of military concern. Authorizes the Board to appoint necessary employees and to have access to necessary equipment, personnel, and facilities of other agencies. Provides for the transfer of related functions of other agencies to the Board. Terminates this act on June 30, 1960. Authorizes necessary appropriation.

EXCERPT FROM LAW

SEC. 2. (b) The Board shall develop, modify, test, and evaluate systems, procedures, facilities, and devices, as well as define the performance characteristics thereof, to meet the needs for safe and efficient navigation and traffic control of all civil and military aviation except for those needs of military agencies which are peculiar to air warfare and primarily of military concern, and select such systems, procedures, facilities, and devices as will best serve such needs and will promote maximum coordination of air traffic control and air defense systems. When there is any substantial question as to whether a matter is of primary concern to the military, the Board is authorized and directed to determine whether it or the appropriate military agency shall have responsibility. Technical information concerning any research and development projects of the military agencies which have potential application to the needs of, or possible conflict with, the common system shall be furnished to the Board to the maximum extent necessary to insure that common system application potential is properly considered and future potential conflicts with the common system are eliminated.

85th Congress, 1st session

Senate Joint Resolution 48. Mr. Magnuson; February 4, 1957 (Labor and Public Welfare). No action taken

Sets up a program to provide an adequate number of qualified teachers and scientific, engineering and medical personnel. Directs the Commissioner of Education to make loans to eligible individuals who wish to undertake a course of scientific, engineering, or medical study. Limits such loans to $750 in any 1 year and $5,000 altogether. Such loans shall be made without security except for a promissory note made payable to the United States. Requires such note to mature after 15 years from the date of the note and to bear interest at a rate equal to the average annual rates, as determined by the Secretary of the Treasury. Authorizes necessary appropriations. Prohibits discrimination against any person because of race, creed, or color.

85th Congress, 1st session

H. R. 560. Mr. Bennett of Florida; January 3, 1957 (Armed Services). No action taken

Scientific Personnel Procurement Act—Establishes a scholarship, and a work-study program for the training and procurement of scientists, engineers, technicians, medical personnel, and other skilled persons to meet the needs of the Armed Forces.

Scholarships would be established, awarded, continued, or discontinued, in accordance with regulations prescribed by the Secretary of Defense.

Determinable periods of service would be required by scholarship beneficiaries.

Work-study programs would be established by the Secretary of the Army, the Air Force, and the Navy, for individuals in civilian status who agree to accept civilian employment with the Armed Forces for periods commensurate with the aid furnished. Such aid may be furnished in advance, or by way of reimbursement, and would be limited to expenses of tuition, library, and laboratory services, purchase or rental of books, materials and supplies, and other services or facilities directly related to the training of such employee.

85th Congress, 1st session

H. R. 8571. Mr. Lane; July 8, 1957 (Education and Labor). No action taken

Federal Tuition Loan Guaranty Act.—Provides that lenders shall be insured against losses on loans made by them for tuition to science and engineering students after January 1, 1958. Limits the total principal amount of new loans to students covered by insurance to $25 million in any fiscal year. Provides that no loans or loans other than for tuition of a science or engineering student, or by one or more lenders in excess of $1,000 in the aggregate to any student in any year, shall be covered by insurance hereunder nor shall the aggregate insured unpaid principal amount of such loans made to any student exceed $4,000 at any time.

INTERNATIONAL EXCHANGE SERVICE OF THE SMITHSONIAN INSTITUTION

The International Exchange Service of the Smithsonian Institution is the "agency of the United States Government for the exchange of scientific, literary, and governmental publications with foreign governments, institutions, and investigators" (U. S. Government Organization Manual, 1957–58, p. 474).

LEGAL BASES FOR THE INTERNATIONAL EXCHANGE OF GOVERNMENT PUBLICATIONS

Joint Resolution 55 (14 Stat. 573), March 2, 1867

"Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That fifty copies of all documents hereafter printed by order of either House of Congress, and fifty copies additional of all documents printed in excess of the usual number, together with fifty copies of each publication issued by any department or bureau of the government, be placed at the disposal of the joint committee on the Library, who shall exchange the same, through the agency of the Smithsonian Institution, for such works published in foreign countries, and especially by foreign governments, as may be deemed by said committee an equivalent, said works to be deposited in the Library of Congress."

Title 44, United States Code, section 139a. International exchange of Government publications

"For the purpose of more fully carrying into effect the provisions of the convention concluded at Brussels on March 15, 1886, and proclaimed by the President of the United States on January 15, 1889, there shall be supplied to the Library of Congress not to exceed one hundred and twenty-five copies each of all Government publications, including the daily and bound copies of the Congressional Record, for distribution, through the Smithsonian Institution, to such foreign governments as may agree to send to the United States similar publications of their governments for delivery to the Library of Congress" (Mar. 2, 1901, No. 16 3, 31 Stat. 1465; Mar. 3, 1925, ch. 421 7, 43 Stat. 1106; June 20, 1936, ch. 630 6, 49 Stat. 1550).

OFFICE OF SCIENCE ADVISER ESTABLISHED [1]

1. Effective immediately, there is established, under the direction of the Under Secretary of State, the Office of the Science Adviser (U/SA). The Office of the Consultant to the Secretary of State on international science matters provided for in Departmental Announcement 201, November 1, 1949, is hereby abolished and its personnel and functions, as redefined below, are transferred to the Office of the Science Adviser.

2. The Office of the Science Adviser shall function as an integral component of the Department, utilizing the Department's staff services and facilities, and shall conduct its activities pursuant to its own terms of reference and those of other components of the Department as prescribed below and in the Manual of Regulations and Procedures, Volume II, Organization.

3. The Science Adviser, as a principal staff officer of the Department, except in the field of atomic energy matters, has been assigned the following responsibilities:

a. Participates in the formulation of foreign policy from the standpoint of science and technology.

b. Provides that, in the administration of international programs and policies, proper consideration is given to scientific and technological aspects.

c. Serves as a central point of liaison with the National Science Foundation, the National Research Council, the National Academy of Sciences, and other public and private organizations interested in the formulation and administration of policy relating to science and technology.

d. Coordinates the activities of the Department in the international exchange of basic scientific information.

[1] Departmental Announcement 31, February 6, 1951.

Source: U. S. Department of State Bulletin, vol. 24, March 26, 1951, p. 519.

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